



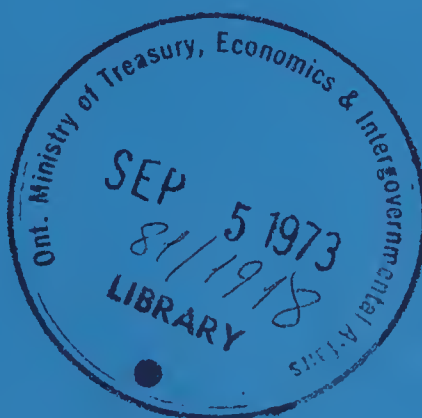
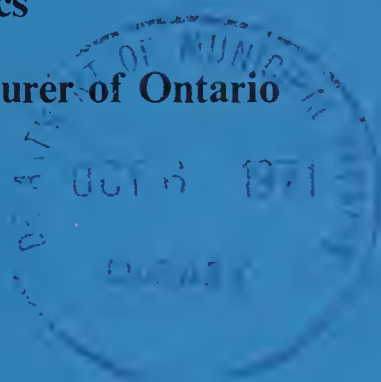
# Ontario Economic Review

REFERENCE COPY

Jan/Feb 1971  
Volume 9, Number 1

Department of Treasury and Economics

Hon. Charles S. MacNaughton, Treasurer of Ontario  
and Minister of Economics  
H. Ian Macdonald, Deputy Minister



HA  
747  
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1971  
VOL. 9  
NO. 1

# Ontario Economic Review

January/February 1971

Volume 9, Number 1

## The Ontario Economy

## Tax Reform and Small Business

Taxation and Fiscal Policy Branch,  
Department of Treasury and Economics

## Selected Economic Indicators

A publication of the  
Department of Treasury  
and Economics  
Government of Ontario

Hon. Charles S. MacNaughton  
*Treasurer of Ontario and  
Minister of Economics*  
H. Ian Macdonald  
*Deputy Minister*

The *Ontario Economic Review* is prepared and edited bimonthly in the Economic Analysis Branch of the Economic and Statistical Services Division, Department of Treasury and Economics. The review presents articles of interest as well as current information on economic activity in Ontario. Signed articles reflect the opinions of their authors and do not necessarily represent the views of the Department.

Subscriptions can be obtained free of charge by writing the Editor, *Ontario Economic Review*, Department of Treasury and Economics, Frost Building, Queen's Park, Toronto 182, Ontario.

### About The Review

The feature article for the January/February edition of the *Ontario Economic Review* advances Ontario's proposals for a new small-business incentive to replace the present dual corporate rate. The plan is based on a limited tax credit to owner-operators as the best means of providing an incentive in the small business area.

The main features of the proposals are:

- a tax credit for individuals of fifty per cent of increased investment in small business;
- the credit will not exceed fifty per cent of personal income tax otherwise payable;
- annual and lifetime dollar limits will be imposed;
- the credit will be restricted to Canadian residents who not only risk their own capital in either an incorporated or an unincorporated business but also pit their own efforts in making the business go;
- tax credits will be recovered when the owner-operator disinvests; and
- rollover provisions will permit asset changes and avoid lock-in effects.

The article was prepared under the direction of Dr. T. M. Russell in the Taxation and Fiscal Policy Branch, Policy Planning Division of the Department of Treasury and Economics.

The Ontario economic forecast for 1971 was prepared by the Economic Planning Branch, Policy Planning Division, Department of Treasury and Economics.

### Indicator Charts, Pages 14-16

Fluctuations in aggregate economic activity — commonly used to define business cycles — do not necessarily correspond with fluctuations in the individual activities which make up the aggregate. Instead different indicators of economic activity may vary with respect to both their rates of growth and the timing of their peaks and troughs: some may grow more rapidly than others, some change direction sooner.

Those activities which tend to assume a direction in advance of the aggregate — because they relate to future rather than present production — are referred to as leading indicators, and are widely used to anticipate the short-run future course of the overall economy. The charts on pages 14-16 in the *Ontario Economic Review* present a number of these leading indicators, as well as several which are coincidental to or lag behind the aggregate, to provide for the reader an opportunity to make such an evaluation.

While comparisons of the timing and direction of general changes in the various indicators can readily be made, great care must be exercised in making such a comparison of the amplitude of fluctuations. Of the three vertical scales used — 'A' (arithmetic) and 'L 1' and 'L 2' (logarithmic scales with one and two cycles respectively over a given vertical distance) — only the logarithmic scales can be used to compare relative changes in different indicators. *And this applies only when all series being compared are on the same logarithmic scale.* In such a situation all parallel lines represent equal rates of growth, the exact rate of growth being determined by the slope of the line.



## Forecast for 1971

The Ontario economy now shows every sign of recovering from the recent recession. Recovery probably commenced in the third and fourth quarters of last year and is now well underway. However, a dramatic upturn cannot be expected and it is likely that 1971 will be characterized by a gradual resumption of earlier patterns with the last quarters showing a full six per cent per year real rate of growth. Overall growth for the year is expected to reach 8.5 per cent. Naturally, these forecasts are based on the assumption that the federal government will make good its commitment to take further measures to reduce unemployment now that inflation has been at least temporarily subdued.

The recovery will be led by strength in the housing sector. Non-residential construction and purchases of machinery and equipment will be delayed until well into the year — perhaps not recovering fully before the fourth quarter or early 1972.

Personal consumption expenditure will show considerable improvement over 1970. Part of this revival is due to a shifting of automobile purchases from the last quarter of 1970 to 1971. A more important factor will be the renewed sales of consumer durables to furnish the record numbers of new housing units ready for occupancy later in the year.

Exports will continue to expand, but at a decreasing rate. It is considered that automobile exports will continue strong as will many of Ontario's mineral products. However, in the latter case a noticeable softening in the demand for metals will be a consideration. Imports will grow more rapidly than in recent years.

At this point, it appears that useful but not spectacular progress will be made against the twin problems of inflation and unemployment. So far as the former is concerned, certain elements of cost inflation are still present and the useful reduction in the price of imported goods due to the appreciation of the Canadian dollar cannot be expected again this year.

Unemployment is likely to remain high for the first half of the year, with minor inroads being achieved later when the economy is again operating closer to capacity. The Ontario government is doing its share with programs to create an estimated 3,845 new jobs this winter.

Although there may be some further adjustment of long-term interest rates, the down-trend will slacken unless the economy

Selected Ontario Statistics	1970	1971	Per Cent Change	
		Forecast	1970/69	1971/70
Gross Provincial Product (\$ billions)	34.7	37.6	6.9	8.5
Implicit Price Index	133.0	137.7	3.6	3.5
Corporate Profits (\$ billions)	3.6	3.9	—3.0	10.0
Wages and Salaries (\$ billions)	18.9	20.5	9.0	9.5
Investment (\$ billions)	6.2	6.7	—1.0	9.0
Retail Sales (\$ billions)	10.8	11.5	2.4	6.0
Unemployment Rate (% of labour force)	4.3	4.0	—	—
Productivity	—	—	1.1	1.5

fails to respond to the stimulus of fiscal and other measures.

The threatened steel strike in the U.S. will ensure that the Ontario steel industry is working to capacity. A strike may occur in Ontario's construction industry, as a number of contracts expire in the second quarter. A protracted strike would set back the recovery of Ontario's economy by several months.

## Foreign Trade

The long-expected slowdown in Canadian export sales was recorded in December, however a preliminary total for the year reveals record exports valued at \$16,887 million. In a recent report the Dominion Bureau of Statistics valued total exports in December at \$1,376 million, down by approximately four per cent from the revised total of \$1,431 million for December, 1969. This is the first year-to-year decline in the monthly figures since August 1969 when the total for that month fell marginally below the level for August, 1968.

Adjusted to discount the usual seasonal fluctuations, the December value of \$1,312 million was the lowest of the year, down from a peak of \$1,479 million in November. Since the middle of last year, analysts had been predicting that the upsurge in exports would not last; but sales did hold up, against expectations, until December. Earlier it was anticipated that slow business conditions in the United States — Canada's major trading partner — and the upward valuation of the Canadian dollar which tended to make Canadian goods more expensive abroad would depress foreign sales. However, a strong

demand for metals and fuel shortages in the United States in addition to an apparent buying mood in parts of Europe and Japan sustained a high level of sales.

As a result of the December slowdown, the annual total, on a preliminary basis, fell short of the \$17 billion mark, however at \$16,887 million it represents a 13 per cent increase over the revised 1969 total of \$14,931 million. Previous to December the advance had been running at an annual rate of up to 20 per cent.

A preliminary total places 1970 imports at \$13,934 million, down by somewhat more than one per cent from the level of \$14,130 million recorded in 1969. This represents the first year-to-year decline in imports since 1958. The December total at \$1,041 million (unadjusted), down 16 per cent from the corresponding 1969 figure underlines the extent of the weakness in this sector.

As a result of a record year for exports with imports virtually unchanged Canada's merchandise surplus reached an unprecedented \$2,952 million in 1970. This level greatly exceeds the previous peacetime record of \$1,266 million in 1968 and the wartime high of \$1,700 million in 1945.

The main feature of the 1970 export performance was substantially increased shipments to countries other than the United States. The value of export shipments to the U.S. increased by only 3.5 per cent while exports to Britain advanced by almost 35 per cent. Shipments to the six-nation European Common Market advanced vigorously by more than 40 per cent with Japan's purchases from Canada up by 27 per cent from 1969.



# Tax Reform and Small Business

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Taxation and Fiscal Policy Branch,  
Department of Treasury and Economics

## FOREWORD

This is the second paper of the Ontario Government containing definite proposals for reform of the Canadian tax system. Since the first paper in June, 1970, the Committees of the House of Commons and Senate on the federal white paper have presented their reports. These reports constitute an important contribution to the current tax reform process.

The Ontario Government was happy to note the emphasis of both reports on the central importance of economic growth in tax reform and that tax reform must not impede savings and investment in Canada. The Ontario Government was also pleased to note the emphasis the Committees placed on achieving a national tax system which could be used by the provinces.

There were two main thrusts to the first *Ontario Proposals*. The first was effective comprehensive relief for low-income Canadians. The second was economic growth.

This article deals only with the second of these thrusts — with its main emphasis on the appropriate taxation of small business in a tax context favourable to Canadian savings and investment. The paper proposes a new incentive to assist a very broad group of Canadians — those who risk their money and employ their energies to start and expand their own businesses — Canadian owner-operators. The Ontario Government believes that the incentive proposed would provide strong encouragement to expanded Canadian participation in the Canadian and world economy. It would do so by helping Canadians raise needed capital. It would not discriminate against foreign investment which will continue to play an important role in Canadian development.

The Ontario Government has advanced its studies on the taxation of small business to the point where it feels the results would now benefit from wider discussion. Accordingly, we invite comment and public discussion by interested taxpayers. We also invite the federal government to sit down with provincial governments and to discuss these and other reform proposals on a frank and open basis where all views are on the table. This is the only way to achieve a partnership approach in the final stages of settling the long-term tax structure for Canada and the provinces. The frankness of discussions between the provincial and federal governments must not be circumscribed by traditionally secret budget procedures which are unsuit-

able where major long-term changes are being made.

The Honourable Charles MacNaughton  
*Treasurer of Ontario*  
and *Minister of Economics*  
December, 1970

## I INTRODUCTION

Tax reform discussions have advanced considerably since the Ontario Government set out its general proposals for national tax reform in its paper *Ontario Proposals for Tax Reform in Canada*.<sup>1</sup> These developments confirm the thrust of the *Ontario Proposals* in their emphasis on economic growth as a central concern of tax reform.<sup>2</sup> The primary purpose of this paper is to expand upon the proposals for the taxation of small business contained in Chapter 6 of that paper. In addition, this paper will expand upon the related proposals affecting savings and investment in Canada. The proposals contained in this paper are properly to be considered as a further development of the basic national tax system contained in the *Ontario Proposals*.

### Small Business Consensus

The *Ontario Proposals* reflected the profound concern of the Ontario Government about the possible effects of the federal white paper proposals on small business in Canada.<sup>3</sup> This widely-shared concern was expressed in the submissions of many taxpayers and other provincial governments, and resulted in the announcement by the federal Minister of Finance of the appointment of a federal civil service committee to study and recommend appropriate measures designed to strengthen the role of small business in Canadian life. It was further reflected in the subsequent reports on the federal proposals by the Senate and Commons Committees.<sup>4,5</sup>

There is clearly a broad consensus in Canada that small businesses require taxing arrangements favourable to their development and growth. There is virtual unanimity that the federal proposal to abolish the lower rate of corporate tax on the first \$35,000 of taxable income without offering any effective alternative is too harsh and that it would be damaging to small business, both by itself and in conjunction with other proposals in the federal white paper. The question is thus not *whether* the original federal proposals should be changed but only *what* should be done and *how*.<sup>6</sup>

### Broad Benefits of Small Business

The reasons *why* something should be done are important in deciding *what* should be done. For example, if the only aim is to meet an alleged lack of "neutrality" in the market place in the raising of capital for small business, any special small business provisions should be designed with this in mind. On the other hand, if the objective is the more practical one of encouraging certain types of activity, a rather different approach will be more appropriate.

Tax incentives are not the only means of assisting small businesses. A very extensive range of incentives is already provided by both the federal and provincial governments outside the tax system. These include market supports, grants, loans, guarantees and a variety of business-related services. Many of these incentives help small businesses but are not restricted to them. Rather, they are designed to achieve selective objectives whether related to a particular industry as with the grants payable under the federal Defence Industry Productivity Program, or to regional development as under the Ontario Equalization of Industrial Opportunity Program.

The position of the Ontario Government is that broad social and economic benefits flow from the effective encouragement of

<sup>1</sup>Hon. Charles MacNaughton, *Ontario Proposals for Tax Reform in Canada*, (Toronto: Department of Treasury and Economics, June, 1970); hereinafter cited as the *Ontario Proposals*.

<sup>2</sup>The *Ontario Proposals* made it clear that the other major concern was comprehensive tax relief for low-income Canadians.

<sup>3</sup>Hon. E. J. Benson, *Proposals for Tax Reform*, (Ottawa: Queen's Printer, 1969); hereinafter cited as the *federal white paper*.

<sup>4</sup>The *Standing Senate Committee on Banking, Trade & Commerce*, *Report on the White Paper Proposals for Tax Reform*, (Ottawa: Queen's Printer, September, 1970); hereinafter cited as the *Senate Report*.

<sup>5</sup>Eighteenth Report of the Standing Committee on Finance, Trade & Economic Affairs respecting the White Paper on Tax Reform, (Ottawa: Queen's Printer, October, 1970); hereinafter cited as the *Commons Report*.

<sup>6</sup>In the light of this consensus, it is interesting to note the comments of the Carter Report respecting withdrawal of the lower corporate rate: "[We] believe it would be unwise to recommend withdrawal of the low corporate rate without making some adjustment within the tax system designed specifically to assist new and small businesses." Report of the Royal Commission on Taxation, (Ottawa: Queen's Printer, 1966). Volume 4, page 277.

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businesses through the tax system. Many of the reasons are described in the *Ontario Proposals*.<sup>7</sup> Accordingly, this paper will consider the best means of utilizing the tax system for fostering a climate or environment of opportunity to which individual Canadians will respond with their own initiative and enterprise.

### Keep Dual Rate until Replaced by Strong Incentive

The position of the Ontario Government is to retain the present dual rate of corporate tax for small business until a new strong incentive is in place.<sup>8</sup> This is in some respects similar to the position of the Commons report which suggests, as a minimum, an approach which seems to involve something like a dual rate. However, that report also suggests that alternative proposals (such as a capital formation tax credit) which might prove more effective in the longer run should be studied.<sup>9</sup> The Senate report recommends retention of the lower rate and offers a method of restricting it to smaller businesses.<sup>10</sup>

This paper will assess the validity of retaining a dual corporate rate on some more appropriate basis. It will also explore the possibility of an effective alternative which will achieve more benefits for the economy at a reasonable cost in revenue. One reason why the Ontario Government favours a strong incentive to Canadians to acquire, develop and expand new and small businesses is because lasting revenue increases can only flow from an efficient and dynamic economy created by individuals who respond to an environment of incentive and opportunity.

### Taxation and Small Business Dynamics

While the federal white paper proposal to eliminate the dual corporate rate generated the greatest amount of concern in public discussion, there are several other important general features of the tax system which can affect both the incentive and ability of Canadians to start a new business or acquire and expand an existing business. All must be taken into account.

Taxation must be viewed in a dynamic context and must recognize the motivations and financial capacities of those affected. The fact that income taxes are normally collected on the basis of a single year does not mean that tax policies should be similarly circumscribed. Successful businesses can take a long time to build. Taxation must recognize this if the building-up process is not to be seriously

impeded. It is too restricted a view of ability-to-pay to regard funds surplus to the needs for productive investment and funds tied up in productive investment as always equally available to pay taxes. This is an essential point in designing taxes which will permit and encourage the growth of the small business sector of the economy.

People's motives in starting or running their own business vary, but they usually include two elements: the greater personal fulfilment in creating or running one's own business; and the hope of building up something permanent — which may provide retirement income, or capital for some other purpose or to leave to one's heirs. Such motivations are not primarily directed at earning slightly more in current income in a particular year. Generally, it is the ability to retain earnings for expansion and to hold on to a reasonable part of what one has built up which is important to the small businessman. Taxation which affects either of these factors can have important effects on the commencement, development and expansion of small business. What is required is greater awareness of the concrete effects of different taxation arrangements on small business in a dynamic sense over the life of the business and the businessman.

### Primary Importance of Effects on Savings and Investment

The Ontario Government approach is that the general savings and investment effects of taxation are of primary importance, to be dealt with in the first instance on a very broad basis related to national goals. These goals include the efficient growth of the economy, the provision of jobs, the control of inflation and the encouragement of Canadian savings.<sup>11</sup> Any tax encouragement of small business should fit sensibly and easily into the general taxation arrangements. But specific tax arrangements cannot make up for inadequate or unwise general arrangements.

The savings and investment approach outlined in the *Ontario Proposals* involved two main elements:

- general taxing provisions favourable to savings and investment which would be applicable to all business; and
- additional special savings and investment promoting taxing arrangements which would be available *only* to individual Canadian residents.<sup>12</sup>

These special arrangements for individual Canadians were also proposed as a means of promoting two other important national objectives:

- increased Canadian ownership in profitable business; and
- broadened economic democracy by making it easier than it is today for more people to save and invest in Canadian enterprise, and so to participate more fully in the economic opportunities of Canada.

### Principles of Ontario Approach to Savings and Investment

The investment and savings approach of the Ontario Government reflects two main principles:

- *Current income differs from capital as a source of future income.* Many unnecessary and undesirable problems flow from a failure to recognize this difference in taxation. Current taxation of income and consumption is appropriate because most taxpayers can adapt to reasonable changes on a current basis — by working more, seeking higher incomes or reducing expenditures. On the other hand, a lifetime basis for taxing capital is generally preferable so long as it remains such and is not diverted into the current consumption stream. Capital investment usually represents the results of the efforts of many years or decades, and is frequently committed for many years into the future. This greatly reduces the degree of taxpayer adaptability in the short run. To the extent that such a lifetime basis of taxing capital is adopted — be it by capital gains or estate taxation — it will lend strong support to particular measures to promote small business, as well as bigger business, in the hands of Canadians.
- *The primary taxation arrangements should provide a framework of opportunity that leaves individuals free to respond in a very broad way as they see fit.* This does not preclude more selective measures inside or outside the tax system, for the achievement of more particular ends. However, it precludes as the primary arrangement the use of taxation, subsidies or loans in a very specific way, since this could introduce a much higher degree of government intervention and direction of activity than is sound for widely applicable measures.

(Washington: U.S. Government Printing Office, 1970).

<sup>8</sup>Ontario Proposals, op. cit., page 33.

<sup>9</sup>Commons Report, op. cit., pages 52 and 53.

<sup>10</sup>Senate Report, op. cit., page 65.

<sup>11</sup>Commons Report, op. cit., pages 8 and 9.

<sup>12</sup>Ontario Proposals, op. cit., pages 21, 25 and 33.

<sup>7</sup>See, beginning of Chapter 6 of the Ontario Proposals. Similar reasons were given for the continuing importance of small businesses in the United States. See, *The President's Task Force, Improving the Prospects of Small Business*,



### Approach of this Paper

Our studies make it clear that there are a variety of small business and related investment options open to policy makers, each with advantages and disadvantages. There are no proposals without disadvantages. Disadvantages, however, must be assessed against the probable gains. Thus, an awareness of the alternatives available is necessary to place any particular proposal in proper perspective. There are no ideal solutions, and a preoccupation with ideal solutions will likely prevent adoption of practical ones.<sup>13</sup>

This lively awareness of alternatives underlies the approach in this paper. Within this approach, the first step is to establish the tax context in which small business is expected to operate. The second step is to identify the key concepts which should guide the particular small business tax arrangements adopted. Only then is it possible to explore the best mechanics or taxation devices to give effect to the guiding concepts which have been accepted. This presupposes identifying what we are trying to achieve in a practical way, before proposing the taxation mechanics to achieve it.

### New Small Business Tax Incentive

After careful study of the alternatives, and the benefits to Canada of a new strong incentive to new and small business, this paper will propose for serious consideration a fresh approach based on abolition of the dual corporate rate. It has a number of novel features:

- only individual Canadian owner-operators would qualify for the incentive;
- the maximum annual amount of the incentive available to an owner-operator would be comparable to the maximum annual benefit now available through the lower corporate rate, but would be dependent upon new or increased investment in unincorporated or incorporated business;
- the incentive would be ultimately recoverable in a manner which should not interfere with sound business decisions or the effectiveness or fairness of the incentive; and
- annual and lifetime limits on the total amount of incentive available to any one person should ensure fairness and administrative workability.

The choice of the Canadian owner-operator as the person to get the incentive means that not every business or investor would benefit. But far more Canadians would benefit than under the present lower corporate

rate. Every small business, whether or not incorporated, could benefit. It would help Canadians to start or acquire a business more easily than the present system. It would enable them to join together in business without loss of tax benefits as at present. Passive investors, large corporations and non-residents would no longer benefit. The only Canadian owner-operators today who would benefit less are those whose initial or expanded investment is insufficient to take full advantage of the incentive. Finally, after introduction of the new system, every Canadian who invests as an owner-operator would be entitled to earn precisely the same lifetime credit as every other Canadian.

### Incentive Strong but Not Unlimited

The incentive would be strong but it would not be unlimited. Being a Canadian owner-operator would not be enough. Investment in the business would also be required. Similarly, investment in the business would not be enough — one must also be a Canadian owner-operator. Not only would there be a limit to the total amount of incentive available to any Canadian, but once in every lifetime the amount received would be fully or partially recovered to the extent the business is successful. And quite apart from recovery, every recipient would have to pay at least as much in annual taxes as he receives in annual tax deferrals. In a real sense, the success of those helped by the incentive would in turn provide revenues to help new Canadian owner-operators to succeed for their own benefit and the benefit of Canada.

The proposed small business incentive is expected to work relatively simply in the vast majority of cases. However, the variety of business arrangements and the predilection of some taxpayers to seek undue advantage of any favourable taxation arrangements mean that a measure of complexity is necessary for the special cases. It is anticipated that the main increase in complexity from tax reform — assuming integration does not replace the present dividend tax credit system — would come from the introduction of capital gains taxation. The administrative features of the proposed incentive should fit reasonably easily into the administrative requirements of capital gains taxation.

### Full Consideration Important

The owner-operator incentive is proposed because it is felt it is workable and would encourage significant response from Cana-

dians. While it is only a proposal, the Ontario Government believes it merits serious consideration in terms of its potential for promoting simultaneously a number of important goals. As a novel proposal, there may be insufficient time to assess it in a deliberate and careful manner and have it ready for implementation by the tax reform target date of January 1, 1972. If this turns out to be the case, the dual corporate rate should be retained for one further year.

The novel aspects of the proposal and the fact that there is no experience from which taxpayer response and revenue impact can be accurately determined in advance make full discussion even more important than usual. A number of the specific features, such as the businesses to be included and excluded, the proposed annual and lifetime dollar limits and the manner and extent of ultimate recovery, are advanced as reasonable starting points for discussion and are certainly open to modification. Further, if the plan were implemented it would be desirable after a few years of operation to review the nature of the response to determine how effectively the incentive is working in relation to the objectives sought.

The proposal is advanced as a long-term encouragement to the development of the Canadian economy by Canadians, and must be considered in this light. At the same time, it has the important merit of not discriminating against foreign investment. Canada will continue to need foreign investment in the foreseeable future if widely accepted goals are to be achieved.

A detailed technical study of the proposals advanced in this article has been prepared in the Taxation and Fiscal Policy Branch, Department of Treasury and Economics. The study contains particulars of the operation of the proposed small business incentive in a variety of circumstances, with arithmetical examples. It also contains arithmetical comparisons between alternative tax systems. This study should assist in the consideration of the desirability and workability of the proposed small business incentive.

## II THE PRESENT SYSTEM AND THE FEDERAL WHITE PAPER PROPOSALS

The Ontario Government approach stresses attention to all tax burdens in order to assess their appropriateness in relation to tax reform objectives. It also emphasizes the importance

<sup>13</sup>The Commons Committee arrived at a similar conclusion. Commons Report, op. cit., page 8.



of economic growth. Now is not an appropriate time to introduce new tax burdens which will make economic growth more difficult to achieve. This chapter compares the present Canadian tax system, the present United States tax system and the federal white paper system in order to appraise how Canadian small business may be best encouraged to develop and grow under a reformed Canadian tax system. This comparison will provide an essential basis for assessing the system proposed by the Ontario Government for small business taxation.

### Present Canadian System

In general, the present system (ignoring the 1968 estate and gift tax changes)<sup>14</sup> constitutes a strong incentive to create and expand new businesses and to retain earnings for investment rather than distribute them. While estate taxes (but not gift taxes) have been reasonably heavy, estate planning has often been able to reduce their burden or spread the period of their impact. Further, the absence of a capital gains tax and the generally lower rates of corporate tax in comparison with high marginal personal tax rates have generally encouraged retention of earnings in a business while it was being built up.

A Canadian starting a business under the present system is in roughly the following position. There is no individual tax concession in respect of any initial business investment. If an individual's business is incorporated, the first \$35,000 of annual taxable income after salaries and bonuses can be retained in the business at about \$10,000 annual saving of corporate tax by virtue of the lower corporate rate being applicable to this level of income. This saving can be lost, however, and the high corporate rate applied to all earnings in some circumstances — if the corporation has other shareholders who are also shareholders of other companies, or if the individual is a shareholder in another company, and the technicalities of the shareholder relationships are such as to give rise to the company being associated with one of these other companies.<sup>15</sup>

High personal tax rates encourage retention of earnings above \$35,000 in many cases, because the corporate rate is less than the personal rate. Most important, however, capital gains are tax-free, so that going public<sup>16</sup> or selling out does not result in any difficulties arise in estate planning in connection with corporate surplus and estate taxation — the potential combined impact of

two taxes at death. While estate planning can frequently modify the impact, it is generally agreed that any tax reform should face this issue head on. Whatever is proposed should deal with the question at death, and not attempt palliative measures like deferring the tax impact past the death of the owner.<sup>17</sup>

The principal advantages of the present system are thus encouragement of retention of earnings for growth and the tax-free treatment of any gains in the capital value of the business. Going public, for example, as a natural stage in the history of an expanding business, creates no tax problems and may even alleviate some. These are strong incentives, and their merit as such was only partially negated by the problems associated with the taxation of corporate surplus and estates.

The lower rate of corporate tax has certain disadvantages, even from the standpoint of small business:

- the restrictions of associated company status;
- the need in most cases that there be profits from the new business itself;
- it does not extend to unincorporated business; and
- it does not begin to provide any significant tax relief until personal incomes exceed about \$10,000 and becomes proportionately more valuable as individual incomes increase.

Nonetheless, the present balance — the dual corporate rate, high graduated personal tax rates and the taxation of corporate income in the hands of corporations and of dividend income in the hands of shareholders — is a stable one which fosters retained earnings in businesses. Any instability in the present system which surrounds the corporate surplus problem arises principally from two elements which could be readily corrected:

- the absence of sensible tax-free corporate reorganization provisions combined with the "sledgehammer effect" of the designated surplus provisions;<sup>18</sup> and,
- the failure to deal directly with the appropriate relationship between the possible taxation of corporate surplus at death and the level of estate taxation.

### United States System

The United States tax system provides similar incentives toward retained earnings by small

business. While the maximum annual per-company savings are less than in Canada at present, at about \$6,500, it is generally easier to qualify a *new* or *different* business in order to get the same benefit more than once. The capital gains aspect is less favourable, at least in principle, while the weight of estate and gift tax is generally comparable. However, United States capital gains tax may be avoided completely by tax-free rollovers<sup>19</sup> to a higher cost basis in the hands of heirs on death, or to the same cost basis by an exchange of shares of the small business corporation for shares of an acquiring company. A combination of both rollovers may be used: first, by selling out in exchange for the stock of a public company, and then by holding that stock to death, at which time it can be sold free of capital gains taxation on the increased value accrued to the date of death. In practice, therefore, despite the existence of a capital gains tax, and a lower rate of tax on only the first \$25,000 of a corporation's income, the present position of the small businessman in the United States is not significantly less favourable than in Canada.

### White Paper System

When it comes to the federal white paper system, including the estate and gift tax changes of 1968, small business is transported into a radically different and harsher world. Gone are the factors which encourage retained earnings. Not only is the favourable treatment of capital gains gone, but there is also the harsher ultimate taxation of capital on the deaths of parents and the much restricted opportunities to ameliorate that impact through estate planning. Both building up and retaining the business become much more difficult. Only wealthy owners of businesses which are not worth more than their book value and do not need retained earnings to grow would benefit from full corporate-personal income tax integration and a top 50 per cent personal income tax rate. They could avoid any capital gains tax and would pay substantially lower annual taxes than at present on fully distributed earnings. By contrast, the sale of a company while closely-held which is valued for its growth potential rather than retained earnings would result in capital gains taxation at 50 per cent, or at 25 per cent as part of going public. In the latter case, there would also be the continuing five-year revaluation rule requiring payment of capital gains tax on any shares retained

<sup>14</sup>A fair assessment of the impact of tax reform on small business requires a comparison of the Canadian tax system before any reform and the complete reformed system. Accordingly, we refer to "present Canadian system" as the system in effect before the estate and gift tax

changes. We refer to the white paper system as including these estate and gift tax changes as part of the federal proposals for tax reform.

<sup>15</sup>This is the associated corporation problem referred to in the white paper (paragraphs 4.16 and 4.17). While the federal white paper stresses

the undoubted abuse of the lower rate by some taxpayers who until 1963 avoided the rules designed to limit the advantage, it does not refer to the restrictive effect of these same rules on normal business arrangements.

<sup>16</sup>"Going public" is the process whereby a



after going public. This is in addition to substantially heavier estate taxation and elimination of the lower corporate rate.

The combined impact of the federal tax reform program represents a much harsher treatment of smaller business than either the present Canadian system or the United States system. The situations where the federal proposals are significantly harsher include starting a business and then selling it at a capital gain; or going public with it; or dying with an accrued capital gain from the business which must then be realized, either to pay the estate taxes or for some other reason such as a partnership buy-sell arrangement or the need for new management or more capital.

### Present Balance Hurt by Federal Proposals

On balance, the present Canadian tax system has probably been more favourable to the creation and expansion of new small business than that in the United States. Of course, the business earnings and capital gains prospects in the United States tend to be greater than in Canada because of the larger markets and higher levels of income and wealth in the United States. At the same time, the effect of the present Canadian tax system has not been so favourable as to promote private savings in Canadian hands in sufficient volume to eliminate the need for foreign investment or to enable Canadians to compete successfully with non-residents in all cases for ownership of Canadian business. It is hard to see how shifting the Canadian tax balance in a manner adverse to private savings by Canadians can avoid worsening the present international balance of ownership and control.

In contrast to both the present Canadian and United States tax systems, the essence of the federal white paper approach is to trade significantly lower taxation of current income distributed to shareholders for harsher annual income taxation of retained earnings (up to the first \$35,000 of annual corporate income) and higher taxation of built-up or accumulated capital of the small business.

The Ontario Government rejects this thrust as inappropriate, not only for small business, but for the whole Canadian economy as well. This rejection was virtually unanimous in every respect in the private submissions to the Commons and Senate Committees and provincial statements on the federal white paper. Finally this rejection was fully supported by the reports of both the Commons and Senate Committees.

*corporation previously owned by one shareholder or a small number of shareholders becomes owned by many shareholders (the public) who do not form a particular group.*

<sup>17</sup>This unsatisfactory approach was adopted in the federal white paper by providing a rollover

## III ONTARIO'S SMALL BUSINESS INCENTIVE

The Ontario tax reform emphasis is one of encouragement of capital investment and retained business earnings for reinvestment. The designing of an effective small business incentive is approached in this context, having regard to the motivations and financial abilities of those affected. Moreover, as there are broad reasons for special small business tax arrangements, the approach must be suitably broad if the desired effects are to be achieved.

The characteristics of a new small business incentive must promote the objective of an environment of economic opportunity for more and more Canadians. At the same time, it is important that the incentive be understandable, capable of reasonable and even-handed administration, responsible in terms of revenue impact, and fair in its availability and in relation to the treatment of other taxpayers who also respond to the needs of the economy. In principle, every Canadian who wants to get into his own business, whether alone or with other Canadians, and who requires capital to do so, should be helped.

### Six Basic Questions

There are six basic questions, the answers to which will determine the form and amount of any incentive based on these principles:

- who or what should qualify?
- what is the basis of getting the incentive?
- should the incentive apply at the individual or corporate levels, or both?
- what limits should be imposed?
- should there be total or partial recovery of the incentive in specified events?
- should there be one incentive or more than one?

A consideration of the six basic questions has led the Ontario Government to advance as its preferred approach, a specific small business incentive based on two fundamentals:

- the only taxpayers to benefit will be individual Canadian resident owner-operators of businesses; and,
- the tax benefit will be directly related to increased investment in businesses.

A number of other features are proposed, but it is the above two features which the Ontario Government regards as basic to an

*at death, but without eliminating potential gains tax subsequent to death by increasing the cost basis to heirs to the fair value on which estate tax is paid as is done in the United States.*

<sup>18</sup>Corporate reorganization is a general term that refers to a variety of different legal means

effective small business incentive to replace the lower rate on the first \$35,000 of income of a corporation.

### Main Incentive Features

The following are the main features of the proposed incentive:

- *available only to individual Canadian owner-operators; not to non-residents, passive investors or corporations.* An owner-operator is that individual who combines his own capital and efforts to run his own business, alone or with others.
- *both incorporated and unincorporated business would benefit.* This would be achieved by making the incentive available to the individual only. There would be no reduction in the tax payable by the corporation.
- *incentive would be related to increased business investment.*
- *incentive would be the equivalent of an individual tax credit equal to 50 per cent of increased business investment.*
- *tax reduction in any one year would be limited to 50 per cent of the personal tax otherwise payable.* In this way annual individual taxes paid would be at least equal to annual tax savings achieved.
- *increased business investment which resulted in a higher tax credit than could be taken in the year of investment could be carried back one year and forward indefinitely.*
- *use of the tax credit approach would permit substantially the same proportionate value for high and low-income earners.*
- *annual and lifetime limits on the value of the incentive, say \$10,000 a year or \$100,000 a lifetime.*
- *property investments, portfolio securities and mining and oil and gas investments would not qualify.*
- *incentive would be recovered fully or partially on death or permanent emigration and on disposition or withdrawal of investment.*
- *reasonable rollover provisions related to reinvestment to avoid lock-in effects<sup>20</sup> arising because of the recovery principle.*

It is believed that the above features would together provide a balanced and workable system. The individual owner-operator and business investment tests would require that

*whereby businesses under common ownership are rearranged by consolidation under a common corporate roof or by separation under separate corporate roofs. The essence is that there be no change of ultimate ownership as a result of the reorganization, although the*



real things happen in the economy, before any incentive benefit could be claimed. These are the real things intended to be encouraged, and only if they were done would there be any incentive benefit. There would be no advantage or disadvantage between incorporating or not incorporating, or between differing corporate structures or shareholdings. The provisions of annual and lifetime limits and ultimate recovery would further reduce the likelihood of attempts to manipulate for the tax advantage. They would also reduce any benefit of doing so.

An incentive given to individual Canadian resident owner-operators cannot be said to be discriminatory in international savings or investment. It would facilitate the raising of capital by Canadian owner-operators but would impose no restrictions on where it was used. Indeed, because of the importance of increasing Canadian-based and owned business involvement in the world economy, Canadian resident owner-operator activity outside Canada would qualify. In many cases, especially in the expanding service business, outside Canada may be the most appropriate place for expansion.

The position of this paper is that it is a certain type of businessman — the Canadian owner-operator — who should get the incentive. The person to be encouraged is the person who risks his own capital and credit and pits his own efforts to make a business grow. With very few exceptions indeed, a business may be regarded as a small business if it is, by and large, financed and operated by the same people. A small business is thus best described as a business which is a person's own business, either alone or along with other people.

If this approach were adopted, passive investors in a small business would not themselves benefit, as they can now. They would be treated like all other investors. Equally, a small business in which the investors were one group, and the professional managers another group, would fail to qualify. It follows that going public would not be impeded so long as the outside share interest did not become so great as to result in Canadian owner-operators losing control.

### Wide Flexibility for Owner-Operators

This basic balance of the proposed incentive, in terms of administrative and revenue considerations, should permit the other features of the incentive to be flexible. In this way, individual Canadian owner-operators could

respond in the manner most suitable to them from a business point of view. As proposed, there could be wide flexibility for Canadian owner-operators:

- almost unlimited freedom to join together with other Canadian owner-operators without tax penalty;
- significant, although not unlimited, freedom to permit non-owner-operators to contribute capital to the business without tax penalty;
- unlimited freedom to grow without tax penalty;
- ability to apply tax reduction privilege against income from other sources, including employment income;
- funds to acquire existing business and every kind of tangible and intangible assets can qualify;
- investments could be timed on a business basis; and
- freedom to incorporate, join a partnership, or operate as a proprietorship, with no tax penalty.

The proposed incentive would in some respects be less broad than the present system:

- it would not apply to all corporations or types of business;
- it would be recoverable, if the owner-operator were successful, although only on disposition or withdrawal, or permanent emigration or death;
- an individual could not get multiple tax benefits through use of more than one corporation;
- large companies, passive investors and non-residents would get no benefits; and
- earnings would not be enough, there must also be business investment.

However, none of these limiting features should reduce the effectiveness of the encouragement to Canadian owner-operators to acquire and expand their businesses. Rather, they should reduce revenue losses and increase fairness by ensuring that the incentive goes to those Canadians who are intended to respond to it.

### Entrepreneurial Capital

It is generally recognized that entrepreneurial ability is scarce, not only in Canada, but everywhere. The Watkins Report found that

Canada was not rich in entrepreneurial and managerial talent (the owner-operator sort of person) and that there has been in Canada a less open and mobile society than is consistent with optimal development of Canadian entrepreneurship. Its report also suggested that if there is any gap in the Canadian financial system, it is "entrepreneurial capital" — capital allied with human skills actively used in developing and managing the enterprise in which it is invested.<sup>21</sup>

Should the broad approach to encouraging owner-operators be extended to those who provide entrepreneurial capital but do not meet the owner-operator test? Is there a category other than the owner-operator and the passive investor which deserves attention as part of a small business incentive? This type of capital is related to launching new things — and if new things in general, or in particular, are also to be encouraged, it would seem preferable to approach this on a separate basis, because the principles and purposes will be different. Of course, the general structure of the tax system will be particularly important for entrepreneurial capital mobility. As entrepreneurial capital is scarce, it seems important that it not get frozen into investments that cease to be entrepreneurial, simply because the tax cost of switching is too high. This question is separate from, although not unrelated to, the issue of incentives to small businesses.

### Size or Newness Test

A size or newness test would narrow the scope of the incentive by excluding those owner-operators whose businesses grew too much or were no longer new. As growth is desired, it is important not to penalize those who succeed in growing. Moreover, it is important to encourage owner-operators to maintain and expand existing businesses as well as to create new businesses.

A newness test would be difficult to apply. It would also favour businesses which changed by revolution or came out of nowhere — a single identifiable step immediately recognized as new — in contrast to those businesses which were in a state of constant change by evolution, where one could never say at any one moment that a new business had been created.

One important practical disadvantage of a size test is that, if it is based on income, it either involves very high marginal rates of tax as the business grows into the cut-off area or else the cut-off is smoothed over such an

*reorganization itself may precede or follow such a change.*

<sup>19</sup>A rollover arises where one asset is substituted for another in a transaction in which any gain or loss is not recognized for tax purposes.

<sup>20</sup>Lock-in arises where a taxpayer prefers to continue to hold an asset rather than pay tax on disposal.

<sup>21</sup>Report of the Task Force, Foreign Ownership and the Structure of Canadian Industry, (Ottawa: Queen's Printer, 1968).



income range that all but the largest corporations would continue to benefit from the lower rate.

The Commons Committee proposal of a disappearing incentive would impose a tax of 66.3 per cent on the first \$70,000 of income above \$35,000, while the Senate Committee proposals would entail a tax rate of 100 per cent on the first \$21,150 of income above \$100,000. These high rates would penalize success and encourage tax manipulation to keep income down in order to avoid them.

Another disadvantage of the size of business test is that it runs counter to desirable mergers designed to increase efficiency through increased scale of operations.<sup>22</sup> This is unfortunate, as smaller scale in Canada is frequently cited as an important factor in the lower productivity of some Canadian industry in relation to United States industry. In the absence of other tests, choosing a size-of-business test will result in part of the benefit going to passive investors, large corporations or non-residents who were shareholders in a corporation receiving the lower rate or other incentive.

### Basis of Getting Incentive

The position of the *Ontario Proposals* is that the incentive should promote economic growth and efficiency by Canadians through limited tax credits or deferments related to increased business investment in qualified assets. Thus, if there is no such increased investment, there would be no tax relief from the incentive, even though the Canadian owner-operator qualified as such.

An incentive related only to business earnings does nothing for the business which one might argue needs it most — the business suffering losses or not yet profitable. While it has the merit of being success-related, it may jeopardize success, by not becoming available early enough in the life of a business. An investment-related approach at the individual level opens up two possibilities. First, if there is other personal income, the increased investment can qualify for a tax reduction on that other income even before the business earns income. Second, even where there is insufficient other personal income, a carry-forward provision ensures getting tax deductions as soon as income does develop.

A lower tax rate on small business income which is unrelated to investment is unquestionably a meaningful incentive. However, an open-ended forever incentive will almost certainly lead to a need for more stringent

and complicated controls, such as the present associated corporation provisions and a size test. Yet these provisions penalize sound mergers and partnerships. Any requirement that the business stay small is contrary to the growth encouragement intended. Moreover, an incentive which only goes to Canadian owner-operators in respect of business investment is likely to achieve more by way of desired results in relation to revenue loss.

Since the incentive would be related to investment in real business assets, what assets should qualify? In the first place, mining and oil and gas investments (that is, investments qualifying for fast write-off or depletion) would be excluded as already covered by special industry rules. In the case of a property investment company, the appropriate level of capital cost allowance is the proper question to be decided. If something more is needed, an investment credit is a more appropriate approach. Again, portfolio-type investments in bonds, mortgages and shares would not qualify, as being appropriately the subject of general rules relating to the taxation of income and gains from such investments. Further consideration may disclose other types of activity which should also be excluded. Apart from these exclusions, *bona fide* investment in every other kind of business asset should be permitted as most consistent with the purposes of the incentive. The source of investment funds should be largely immaterial, and borrowed money or personal guarantees in respect of borrowed money should normally qualify.

### Individual or Corporate Level

The great merit of the lower rate of tax at the corporate level is that, at least in principle, it is relatively simple to administer and understand. The associated corporation problem has been the principal source of administrative difficulties. There are, nonetheless, a number of disadvantages of a corporate level incentive, some of which have already been alluded to:

- without size criteria, large corporations benefit and without an ownership test, non-residents benefit;
- with size criteria, growth is penalized and manipulation encouraged;
- it can be relatively inflexible, with natural business arrangements penalized on the one hand while unnatural business arrangements are encouraged on the other;

- the incentive cannot be used to reduce tax on other personal income during periods of little business income or business losses;
- distinguishing between corporations has been universally rejected in the case of federal proposal for a closely-held wide-held distinction. Similar problems will inevitably arise in attempts to distinguish between corporations for the purpose of qualifying for the lower rate; and
- it does not apply equally to the incorporated and unincorporated business, and benefits high-income taxpayers proportionately more than low-income taxpayers.

The point about individual owner-operator business investment is that it is real. Corporations are essentially artificial and can be manipulated and multiplied in a fashion not necessarily related to real business activity. This is not possible with individuals and is difficult to achieve with investment in business assets. Moreover, a size test based on income is more easily met artificially than a test related to investment. It is easier to keep corporate income down than to get business investment up, in addition to being the opposite of what is desired.

### Amounts and Limits of Incentive

The approximate value of the present rate of tax to a one-man business corporation earning at least \$35,000 a year and reinvesting those earnings in growth is \$10,000 per year. Accordingly, it is proposed that the maximum incentive per year for any individual owner-operator could be the same, but in the revised form of a tax credit equal to one-half of increased qualified investments. By using a tax credit, the proportionate amount of tax benefit available to individuals will be unaffected by the level of their personal income. The timing of tax credit deductions would be affected by the requirement that there be a maximum credit in any one year of 50 per cent of the personal tax otherwise payable in that year.<sup>23</sup> Moreover, every owner-operator would face the same lifetime limit on the maximum dollar value of the incentive.

If one-half of the amount of increased qualified investment exceeded the amount of tax credit which could be taken in a particular year, the unused portion of the increased investment could be carried back one year and carried forward indefinitely. It could be utilized for tax credits as quickly as possible within the limit of not more than a 50 per

<sup>22</sup>If four owner-operators each had a business of the maximum qualifying size, then however sensible it might be for them to join together, the tax cost would be \$30,000 a year under the

present system and \$40,000 a year under the Senate or Commons Committee proposals. This would constitute a heavy penalty for joining together.

<sup>23</sup>Only personal income tax would qualify for reduction. Capital gains under the Ontario Proposals are to be taxed under a separate plan without reference to personal income taxation.



cent reduction in tax in any one year. In this way, timing of investments could be made in response to business and not tax considerations.

Under the Senate and Commons proposals, as well as the present system, a one-man company earning exactly \$35,000 in business income a year could do so forever, without a dollar increase in investment, and still save \$10,000 annual corporate tax. It seems likely that this open-ended low rate is unnecessarily costly in relation to the objectives set. If there were a \$100,000 lifetime limit — a difficult concept with a corporation, which would presumably require a new business test of some kind — it would mean a \$200,000 qualified investment in the business. If four owner-operators joined together, it could mean building up to \$800,000 qualified investment in a business over a ten-year period. In any event, the limits which are established would require review from time to time to ensure they were appropriate to changed conditions.

An individual owner-operator should be reasonably well established at a \$200,000 qualified investment and be in a position to raise funds for expansion on the same basis as others. From that point on, it will be the general tax climate which will be of paramount importance. As mentioned previously, the specific small business arrangements should not have to compensate for inappropriate rules relating to savings and investment generally.

### Recovery of Incentive

The present and Senate proposed low rate and the Commons incentive are permanent, as the reduced corporate tax need never be repaid. The Commons report would impose a higher tax on dividend distribution because of the lower corporate tax. However, neither report suggested any offsetting capital gains provisions in recognition of their small business recommendations. In contrast, the Ontario Government proposes recovery of the small business tax credit.

If there is to be such recovery, an offset is necessary to avoid the serious effects which could occur with the 50 per cent tax rate applicable to the amount received on any disposal or withdrawal of the investment. For this reason, it is essential there be a rollover reinvestment of the proceeds from the qualified investment, subject only to rules to prevent abuse. This would be a minimum,

and a preferable approach would be broader rollover provisions.

In the case of smaller estates, the proposed recovery of the incentive at a rate of 50 per cent of the proceeds of the investment on which the incentive was claimed could prove too harsh. In such cases, it would be possible to provide, for example, that recovery be taxed at only 25 per cent as a deemed capital gain on death. The precise rules would depend upon decisions related to rollovers and estate exemptions.

### One or More Incentives?

It seems reasonably clear that if encouragement of owner-operators who are Canadian individuals is the prime purpose of the incentive, then the direct approach of a Canadian owner-operator investment incentive will provide the greatest impact as the primary incentive. If more is required, the way to achieve it is to moderate the limitation on the amount of incentive available. The possibility of additional incentives for specific purposes is discussed in Chapter IV.

### Commencement of New System

Careful consideration will be required on a number of administrative aspects if the new system is to run smoothly. The incentive is broadly conceived and should not be hemmed in by administrative limitations inappropriate to the social and economic objectives sought. Simple tests and methods for the vast majority of situations should only be complemented by more complex rules where this

is essential to ensure reasonable fairness and compliance in certain special cases.

As previously stated, the Ontario Government believes the new system will have reasonable balance after it has been in effect for a period of time. Special rules, however, may be required in the transition period.

No investment by the owner-operator prior to the start-up of the new system would qualify for the proposed investment-related incentives. Thus, there would be no revenue losses referable to investments made under the present system when different taxing arrangements have prevailed, as only new investments would qualify.

During the first few years of the new incentive system it may be necessary, in order to avoid risk of manipulation, to exclude from qualifying any business investment made in a not-at-arm's length transaction. This would reduce any incentive to manipulate within family groups. It would be desirable in the future — perhaps after a determined transition period, probably five years — to drop such a restriction or make it significantly less restrictive.

The ability of heirs to use the incentive to assist in acquiring an existing small business from the estate of the deceased owner would help avoid unnecessary sell-outs of Canadian businesses based on the need for cash to pay estate and capital gains taxes arising on death. It would be undesirable to make it more difficult for a person active in a family business to acquire that business than to acquire a business with which he had no previous connection.

### Some Examples

The following examples illustrate the workings of the credit and its recovery in the three basic types of owner-operator situation, and show the net advantage to the owner-operator compared with the present incentive.<sup>24</sup>

#### A. A Sole Proprietor

Investment during the year - - - - -	\$ 3,000
Business profits - - - - -	\$ 7,000
Other income - - - - -	\$ 500
Total income - - - - -	\$ 7,500
Tax payable, pre-credit - - - - -	\$ 800
Tax credit available, lesser of:	
i) Annual limit - - - - -	\$10,000
ii) 50% of investment - - - - -	\$ 1,500
iii) 50% of pre-credit tax - - - - -	\$ 400
Tax payable after credit - - - - -	\$ 400
Increased investment utilized for credit - - - - -	\$ 800
Adjusted cost basis of investment for	
determination of future capital gains	
tax or recovery of credit - - - - -	\$ 2,200
Increased investment carried back or forward - - - - -	\$ 2,200

<sup>24</sup>The examples assume a married taxpayer with two dependent children.



The credit would represent an incentive not available to the proprietor under the present system. In the case of a farmer it would be an additional incentive to investment over and above the continued use of the cash basis method of determining income enjoyed under the present system.

B. *An Active Partner*

Acquisition of interest in partnership - - - - -	\$15,000
	<div>AmountTax</div>
Share of accrual basis profits - - - - -	\$15,000\$ 3,100
Share of cash basis profits (where applicable) - - - - -	\$10,000\$ 1,500
Tax credit available only if filing on an accrual basis, being the lesser of:	
i) Annual limit - - - - -	\$10,000
ii) 50% of investment - - - - -	\$ 7,500
iii) 50% of pre-credit tax - - - - -	\$ 1,500\$ 1,550

The credit would represent an incentive not available to a partner under the present system. The partner would have the option of filing on a cash basis (where he is entitled to do so as a farmer or professional) and paying \$1,500 of current tax as under the present system or filing on an accrual basis, paying \$1,550 in current tax and reducing the cost basis of his investment for capital gains tax and tax credit recovery purposes by \$1,550.

C. *A Majority Shareholder*

Investment in corporation - - - - -	\$30,000
Profits of corporation before salary and tax - - - - -	\$25,000
Salary - - - - -	\$25,000
Corporate profit - - - - -	\$ 0
Personal tax, pre-credit - - - - -	\$ 7,100
Reinvestment in the corporation by way of further shares or debt - - - - -	\$ 9,000
Tax credit available being the lesser of:	
i) Annual limit - - - - -	\$10,000
ii) 50% of investment (\$30,000 + \$9,000) - - - - -	\$19,500
iii) 50% of pre-credit tax - - - - -	3,550\$ 3,550
Increased investment utilized for tax credit - - - - -	\$ 7,100
Adjusted cost basis of investment - - - - -	\$31,900
Increased investment available for credit in subsequent years - - - - -	\$31,900

- After personal tax of \$3,550 and further investment in the company of \$9,000, \$12,450 is available for personal use.
- Under the present lower corporate rate system, the taxpayer would have somewhat less available for investment in the corporation if he drew a salary of \$15,500 to provide him with after-tax personal funds of approximately \$12,500. This would leave \$9,500 of earnings to be taxed in the corporation for after-tax earnings of \$7,300.
- If he should sell his investment in the following year at the value shown in the books of the company he would realize - - - - - \$39,000
- which when compared with the adjusted cost basis of his investment of - - - - - \$31,900
- would give rise to a gain of - - - - - \$ 7,100
- and a tax (at 50%) of - - - - - \$ 3,550
- The \$3,550 of tax credit would therefore be fully recovered.

IV OTHER MATTERS RELATED TO SMALL BUSINESS TAXATION

There are a number of other matters related to the taxation of small business which merit discussion in the context of the Ontario approach to the need for Canadian savings and

investment and of the small business incentive proposed in this paper.

Farmers

The federal white paper proposes retention of the cash method of reporting for farmers.

Farmers who qualify as owner-operators (taxpayers who farm as a hobby would not meet the normal test of an owner-operator) should also have the option of taking advantage of the new small business incentive. It is to their advantage to do so. Traditionally, farmers have faced severe cash problems with almost all their assets tied up in fixed investment. If the new small business incentives and existing provisions relating to investments of farmers are not adequate to help farmers meet these cash problems, additional changes by way of faster write-offs or investment credits may prove desirable. The continued efficiency of Canadian farming will depend on the ability of Canadian farmers to finance even greater fixed investment in the future than in the past. This is an important priority which the reformed tax system must reflect.

Other Possible Incentives

More specific incentives in selected areas may be possible and desirable in addition to the small business incentive. There are a number of possible devices which could be explored from time to time in relation to particular objectives, such as:

- a permanent carry-forward class of high technology or innovation expenditures similar to the mining exploration and pre-production expenditures;<sup>25</sup>
- a lower effective rate of tax;
- accelerated capital cost allowance, investment credit or deduction of 150 per cent of a qualified expenditure (such as the former scientific research tax incentive); and
- special treatment of stock options to key employees similar to principles of proposed small business incentive.

In addition to Canadian owner-operators, there may be particular business activities — many of which will fall into the small business category — which it is especially desired to stimulate in order to achieve more selective objectives than the general one of encouraging small business. These might include businesses new to Canada, businesses new to a disadvantaged region in Canada, high technology businesses, heavy export-type businesses, or Canadian-identity businesses like books or films. In such cases both entrepreneurial capital and the passive investor might also benefit, with related benefits to Canadian small business.

<sup>25</sup>This would only be applicable in those cases where the present five-year limit for the carry-forward of business losses is insufficient.



In particular, additional encouragement may be needed for innovative small businesses. Such businesses are often better able to respond more quickly to market changes than a large corporation and, therefore, may be better placed to introduce and market an innovation, provided they are able to obtain sufficient capital. Many of the major innovations of the present century — penicillin, the jet engine, television, radar, the Polaroid camera, and xerography, for example — were the result of an individual's initiative and persistence in developing a market for a new product. We share the view of the U.S. Department of Commerce on this matter:

From a number of different points of view, we are persuaded that a unique cost-benefit opportunity exists in the provision of incentives aimed at encouraging independent inventors, inventor-entrepreneurs, and small technologically based businesses. The cost of special incentives to them is likely to be low. The benefits are likely to be high.<sup>26</sup>

#### Canadian Development Tax Incentive Plan

Among many possible approaches is an adaptation of the owner-operator investment-related approach of the small business plan by establishing a Canadian development capital investment tax credit plan. This incentive could be aimed at Canadian individuals or intermediaries like mutual funds whose only holders were Canadian individuals. Businesses in which investment would qualify for the tax credit could be those whose ownership met similar tests to those now mandatory for banks, trust companies and broadcasting companies — that is, not more than 25 per cent ownership in the hands of non-residents.

This approach to Canadian development may be contrasted with a government corporation like the proposed Canada Development Corporation. This approach would decentralize investment decisions in the general areas identified for special incentive, as opposed to even more centralization in another government bureaucracy. It would be a positive approach to increased Canadian ownership by facilitating the investment itself by individual Canadians in those areas where there is a special public interest in development by Canadians. It would involve no discrimination against non-residents in the same business, as all businesses would be taxed in the same way, regardless of their ownership. The approach is neither negative nor protectionist. It would do no more than make

capital somewhat more accessible to Canadians in competition with non-residents, many of whom have significantly more capital to draw upon. It would be more efficient than the across-the-board decrease in the taxation of dividends which would result from both the full integration and half-integration proposals of the federal white paper. It would not be open to the charge made against the federal proposals that they were discriminatory in international investment.

There are many possibilities. The incentive could supplement the proposed tax credit for Canadian owner-operators. Or it could be an alternative, depending on how strong an incentive is desired. It could be structured to benefit Canadian individuals, while encouraging the pooling of savings in the hands of Canadian risk capital intermediaries. Of course, great care would need to be taken in choosing areas for the incentive, and its effectiveness would need to be reviewed to ensure the results merited the incentive.

#### Full Integration Benefits for Smaller Business

At this point, given the views of the Senate and Commons Committees, and of the provincial governments, including the Ontario Government, it seems quite clear that full integration will not be a general feature of the reformed federal system. The Ontario position is that there should be no integration as such, and that any general incentive to invest in Canadian equity shares should be simple and direct (like the dividend tax credit), without resort to complex procedures or theories about who really pays the corporate tax. Nonetheless, the *Ontario Proposals* expressed belief in the possibility that some new approaches were possible in dealing with those smaller companies which are similar to unincorporated proprietorships and partnerships.<sup>27</sup>

The Commons Committee did recommend that a partnership option be available for small closely-held corporations (a distinction the Commons Committee would keep for this purpose and for small business relief) and full integration for the first \$50,000 of annual taxable income for Canadian closely-held corporations controlled by Canadian residents. This type of integration would benefit passive investors as well as owner-operators and, unless restricted, could result in a greater than \$50,000 cumulative benefit to an individual investor in several closely-held corporations. These effects do not seem necessary or desirable.

#### Alternative to Commons Committee Proposal

An alternative approach consistent with the thinking of the Commons Committee but more in keeping with the owner-operator type of incentive would be to make integration a privilege of individual Canadian owner-operator shareholders, rather than relate it to a type of corporation. The reason for some measure of full integration is to try to equalize the tax position of the small incorporated business with the small proprietorship or partnership. This argument has merit when considering the owner-operator shareholder of a corporation but has little or no merit when considering the passive investor in that corporation. This equalization is not as important an objective for the Ontario Government as it seemed to be for the federal government in its white paper. This is because incorporation is not difficult, and, if the cash method were continued for professionals, who sometimes cannot incorporate, there would be little practical reason for concern about different treatment between incorporated and unincorporated business by reason of a tax on dividends. On the other hand, practical integration can and will be achieved for owner-operators to the full extent of justified salaries. Beyond that, it seems reasonable for owner-operators, in their role as investors, to be taxed on dividend distributions on the same basis as any other investor — that is, taxed on dividends subject to a general dividend tax credit.

The alternative approach would rest on three principles:

- for personal business income of up to say \$50,000 a year, there is validity in the feeling there should be little tax difference between an incorporated and an unincorporated business;
- business income that really reflects personal services should be taxed on essentially the same basis as all personal income, namely at personal rates, and not be subject to two taxes, once in the corporation and once in the hands of the individual shareholder. When business income climbs beyond the personal service element, all corporate business income should be taxed alike — once in the corporation and once in the hands of the shareholder subject to dividend tax credit to Canadian resident individual shareholders; and
- all corporations should be treated the same, and any incentive relief should be to individual Canadian shareholders only.

<sup>26</sup>Technological Innovation: Its Environment and Management, (Washington: U.S. Department of Commerce, 1966).

<sup>27</sup>Ontario Proposals, op. cit., page 23.



The tests for qualification could be identical to the owner-operator qualifications required for the proposed small business incentive. Possible techniques would include any one or all of the following:

- a "safe-haven" salary approach. Any individual taxpayer qualifying as an owner-operator could take out say \$50,000 as salary — thus a deduction from company income — and no question of justification of the propriety of salary would be raised. This would be \$50,000 aggregate of all salaries and business income of a particular owner-operator. On the other hand, larger salaries could be permitted where justifiable as a reasonable business expense;
- a partnership election by the individual owner-operator whereby up to \$50,000 of business income and salary is deemed his income and salary and credit for corporate tax paid on appropriate portion is allowed. Again, the maximum limit would be \$50,000 of all such business income and salary from all sources; and
- a personal integration right of up to \$50,000 (minus salaries and other business incomes) in respect of actual dividends received from all companies in which the taxpayer is an owner-operator.

The practical effect of this approach would be that a qualifying taxpayer could elect to be taxed at personal rates only on annual income up to \$50,000. Beyond that, he would have to receive and justify a higher salary as reasonable, or would be subject to tax on dividend distributions on the same basis as other investors.

### Cash Method of Reporting Income

The present system permits a professional or a farmer to report his income on a cash basis. The white paper proposed its withdrawal for the professional, the Senate Committee recommended retention, and the Commons Committee recommended a mid-position. However, as these taxpayers are themselves owner-operators, they would be able to take advantage of the proposed incentive. Certainly, it would be inconsistent to offer special taxing arrangements to small business to replace the present low rate, and not recognize the parallel to the professionals, whom the federal white paper proposed to tax on money they have not yet received.

In effect, the present cash basis for most professionals is not as favourable as the present lower rate of tax, for two reasons.

First, it is unlikely that \$10,000 annual tax will be deferred each year, year after year, as is the case with the lower rate. Second, there is almost always a day of reckoning when the receivables and work in process are recovered at the end of the road. Even the present cash basis for most professionals would not be as favourable as an annual \$10,000, lifetime \$100,000, tax credit for smaller business. Very few, if any, individual professionals would reach a position of having \$200,000 of untaxed accounts receivable and inventory on hand at any one time. Yet the cash basis is an extremely simple method that puts self-employed professionals on the same tax basis as employed professionals, and on a similar basis to small corporations. Many professionals do not have substantial investment in other than accounts receivable and inventory, which are fully taken care of by the cash method. These considerations argue for retention of the present cash method, which would maintain rough equivalence between professionals and those able to take advantage of the proposed small business incentive. It would be possible to give professionals the right to elect to go on an accrual basis and take the small business incentive instead if this seemed desirable. This approach would eliminate any question of advantage or disadvantage between professionals who cannot incorporate and those businessmen who are able to incorporate and who would be able to get the proposed new small business incentive.

## V SAVINGS AND INVESTMENT

The Ontario approach reflects greater concern than the federal proposals about the general savings and investment effects of tax reform on economic growth. The small business incentive proposed in this paper reflects this concern and is intended to operate as part of the general reformed system advanced in the *Ontario Proposals*. This Chapter explores the Ontario system, partly in relation to the tax system comparison contained in Chapter II, and partly in relation to the small business incentive proposed in Chapter III.

As a first stage, the Ontario approach is to modify the existing tax structure affecting business and investments in two main ways. First, Ontario's proposed rate schedule reduces the top rate to 65 per cent.<sup>28</sup> The Ontario decision to keep the top rate signifi-

cantly above 50 per cent and to reject the integration proposals has the merit of reducing the tendency to move to the personal rate structure implicit in the federal white paper. Second, changes in the taxation of corporations and shareholders would eliminate loopholes and increase the dividend tax credit slightly to the benefit of low and middle-income groups. It would then introduce a moderate but fully separate capital gains tax and reduce estate taxation in order to achieve a level of capital taxation which will not reduce savings or discourage enterprise in the creation and expansion of business by Canadians.

### Federal White Paper Impact

If the federal white paper proposals of a top 50 per cent rate were adopted, there would be a powerful tendency for business to seek access to the personal rate structure in order to avoid any double taxation of corporate source income inherent in the federal integration proposals. This would not only create business distortions and revenue losses, but would largely eliminate the tendency of the present system to encourage earnings retention for business growth. When added to the heavier taxation of capital of the federal approach, there would be a significant shift in the balance of influences towards consumption and away from savings. The Ontario Government's view is that small business cannot hope to thrive in such a climate.

### Capital Gains

The Ontario Government's approach to capital-gains taxation is generally less severe than the federal proposals on all capital gains except short-term gains and gains of traders in shares of Canadian widely-held companies<sup>29</sup> and those in the hands of well-to-do individuals from their shares in mature non-growth private companies.<sup>30</sup> However, unlike the present system in relation to corporate surplus, and the federal white paper proposals in relation to capital gains on death, the *Ontario Proposals* for deemed realization of capital gains at death and reduced estate taxation face squarely the issue of the appropriate level of all capital taxation at death.

### Rollovers

Any form of capital gains taxation based on the realization principle, as proposed by the Ontario Government, may impede economically desirable transfers. The *Ontario Propo-*

<sup>28</sup>This contrasts with the federal white paper and Senate Committee proposals of a top rate of 50 per cent and the Commons Committee proposals of a top rate of 60 per cent. See, *Ontario Proposals*, op. cit., page 20; and *Staff*

*Paper*, Effects of Ontario's Personal Income Tax Proposals. *Ontario Studies in Tax Reform 2*, (Toronto: Department of Treasury and Economics, December, 1970), page 18.

<sup>29</sup>The Ontario proposals would tax these gains up to 65 per cent as income, whereas the top rate under the federal proposals would be 25 per cent.



sals recognized this and called for provisions to facilitate necessary and desirable changes in the ownership of capital assets. They also recognized general problems of economic efficiency and expressed a willingness to consider variations in the general framework which would assist in their solution.

The basic solution to these problems lies in appropriate rollover provisions. One approach is to restrict rollovers stringently, in which case many economically desirable transfers are almost certain to be impeded. This was the approach of the federal white paper, except the almost unanimously disapproved five-year revaluation proposal was regarded as a sufficient protection to allow broad tax-free rollovers in the case of widely-held shares. Another solution is to widen the rollover provisions in which case many normal decisions will be distorted in order to get under the umbrella of the tax-free rollover. This is basically the United States approach. This has led to takeovers and mergers in which an exchange of shares takes the place of cash payment, with results that are not always satisfactory.

The *Ontario Proposals* do not take a specific position on rollovers, but leave the matter open for discussion. Ontario favours the broadest possible rollovers to minimize taxation as an influence in investment decisions. One alternative, as it affects small business, is to permit a rollover on any sale of shares by an owner-operator in a small business, or of the small business itself, provided the proceeds are reinvested. This would completely eliminate any tax impediment to going public or merging or selling-out to a larger company. Any such decision could then be based solely on considerations of economic merit, which would eliminate the type of distortion that occurs under the United States system of tax-free share exchanges.

If a broader rollover than in the United States seems desirable for small business, the next question is whether it would be sound to exclude real assets and public company shares from a reinvestment rollover approach. There is no question that the need for both private savings in Canadian hands and capital market efficiency strongly favours a reinvestment-related tax-free rollover approach for all shares and business assets. With deemed realization on death, an important equity argument against the approach is substantially lightened, especially if one regards the taxation of capital as more appropriate having

a lifetime perspective, in comparison with the taxation of income or consumption, which may more appropriately be on a current basis.

### Long-Term Structure

The *Ontario Proposals* are based on the central importance of savings and investment for economic growth as the only reliable generator of increased revenues to governments. Thus, the Ontario Government does not believe in designing a long-term structure on the basis of short-run revenue considerations. For any rollover will only delay the collection until the gain is realized in spendable form or the taxpayer leaves the country or dies. Nonetheless, the question arises as to the likely revenue impact of granting wide rollover privileges during the lifetime of the taxpayer based on reinvestment. It seems unlikely to be great. Full taxation of short-term and trading gains and taxation of gains realized in spendable form would be unaffected. So would the deemed realization of gains on death. Moreover, the Ontario gains base would be higher than under the federal proposals, because it would include accrued gains on death and retained earnings. Also, the Ontario proposed dividend tax credit would be less generous to high-income taxpayers than either the federal proposal for full integration for closely-held corporations and half-integration for Canadian widely-held corporations, or the half-integration proposal for all Canadian corporations advanced by the Commons Committee.

It is important to note that the Ontario Government expects an annual net revenue gain of only \$100 million from the combined taxation of estates and capital gains as a result of its national tax reform package.<sup>31</sup> As some capital gains would, in any event, be used for consumption, not reinvestment, any adverse general impact on Canadian savings should be moderate and acceptable. A general reinvestment-related rollover would further favour savings over consumption. In assessing this net revenue gain, it is to be noted that the integration revenue losses proposed by the federal white paper were regarded as unnecessary and undesirable by the Ontario Government. Under the *Ontario Proposals*, the revenue expected from capital gains would not, as under the federal white paper, be offset by reduced revenues from what the Ontario Government regards as an unnecessarily generous reduction in the taxation of current dividends and other corporate distributions.

### Encouragement to Canadians

The Ontario approach seeks fairness and moderate revenue gains from introducing a capital gains tax, without requiring damage to savings or investment in general or to the dynamics of Canadian small business in particular. They reflect fully the view that a dynamic economy is the only source of lasting revenue gains that are compatible with bearable tax levels. While the Ontario capital gains and related estate tax reduction proposals have not been presented in full detail, the views expressed in this chapter point the way to a reformed tax system which, with the addition of a sound incentive to small business, would effectively encourage investment by Canadians in the economy of their country.

## VI CONCLUSION

The Ontario Government is satisfied that its proposals relating to savings and investment and the taxation of corporations and shareholders constitute the best basis for sound and workable tax reform which will contribute to the efficient growth of the Canadian economy.

The Ontario Government has proposed a novel small-business incentive to replace the present dual rate of corporate tax. The proposal reflects Ontario's conviction that broad social and economic benefits can flow from encouraging Canadians to own and expand their own businesses. The focus on the individual Canadian owner-operator as the person to get the incentive constitutes a powerful long-term encouragement to the development of the Canadian economy by Canadians.

The Canadian economy will continue to need foreign capital for its efficient development. The Ontario approach to the taxation of business and investment is based on facilitating capital investment by Canadians, without any discrimination against international business investment. This is important in the face of a world shortage of capital and developing protectionism in many countries. Canada has a major stake in reasonably free international trade and capital movements. For this reason, Canadian tax policies should not be inward-looking.

Most important of all, the Ontario Government hopes that the approach and proposals of this paper will be carefully considered by the federal government. Ontario is fully prepared to discuss these proposals at both the ministerial and official levels.

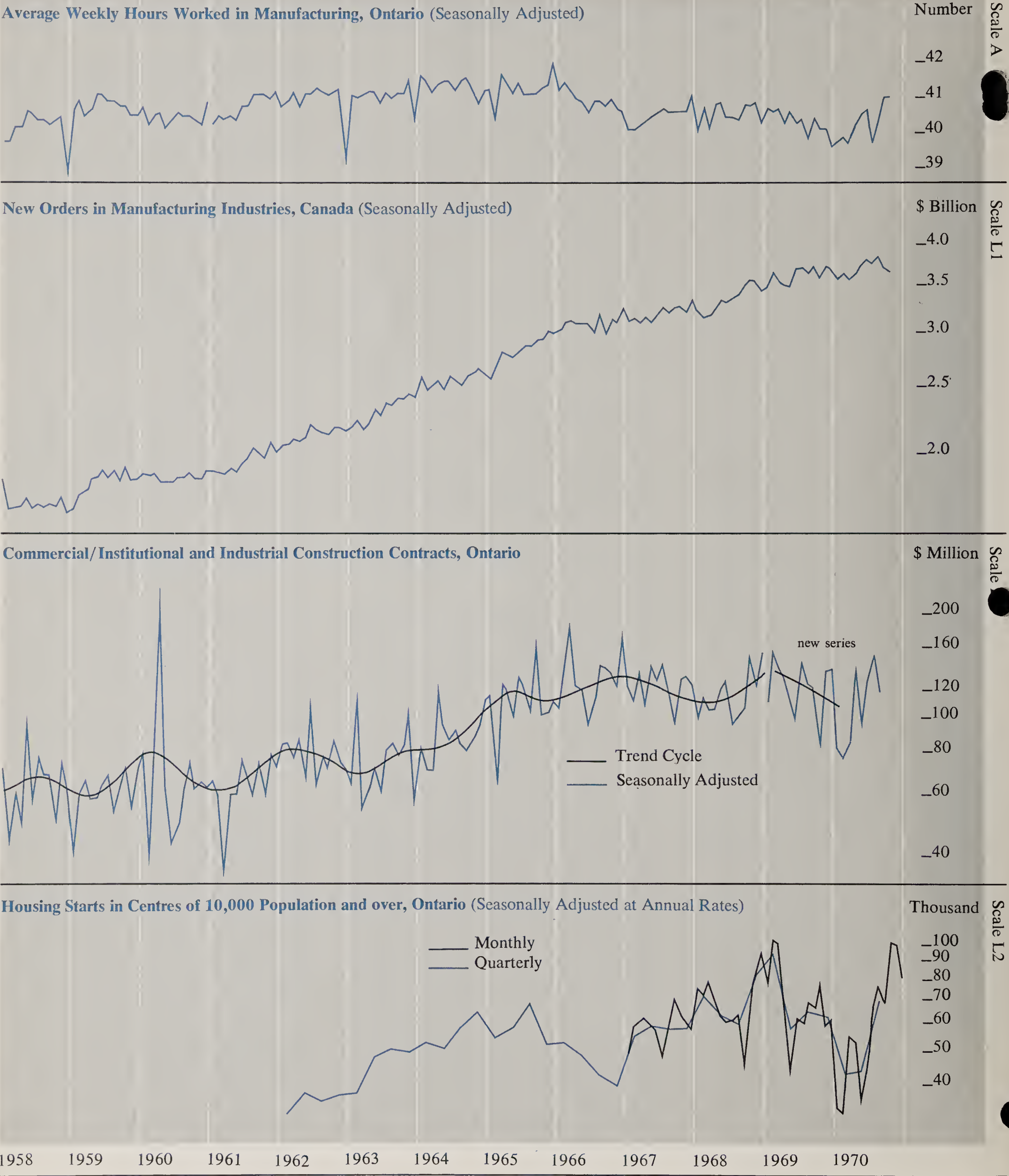
<sup>30</sup>If the only gains reflected retained earnings, there would normally be no tax under the federal proposals, but a 25 per cent capital gains tax would be payable under the Ontario proposals.

<sup>31</sup>Ontario Proposals, op. cit., page 45.



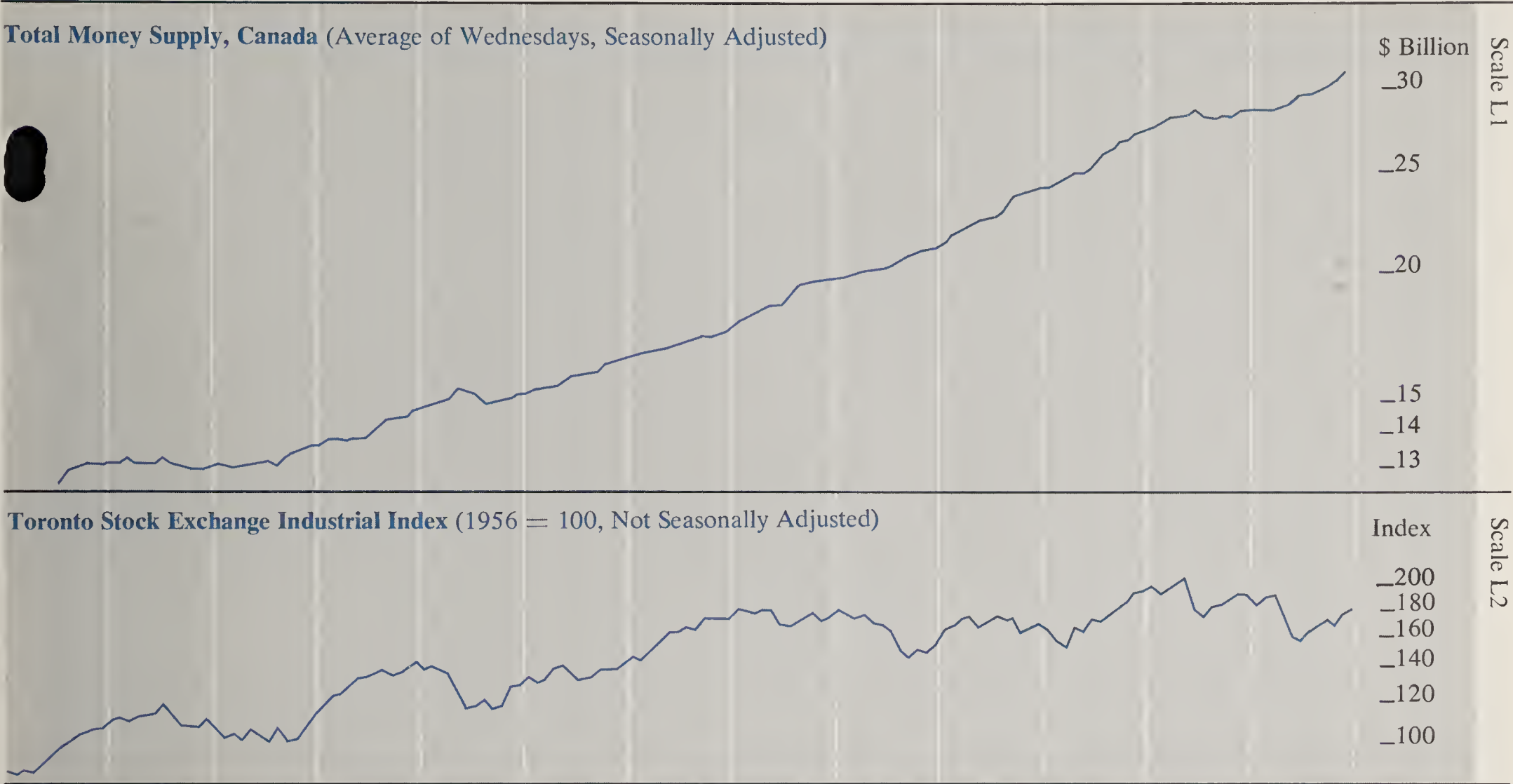
# Selected Economic Indicators

## Leading Indicators

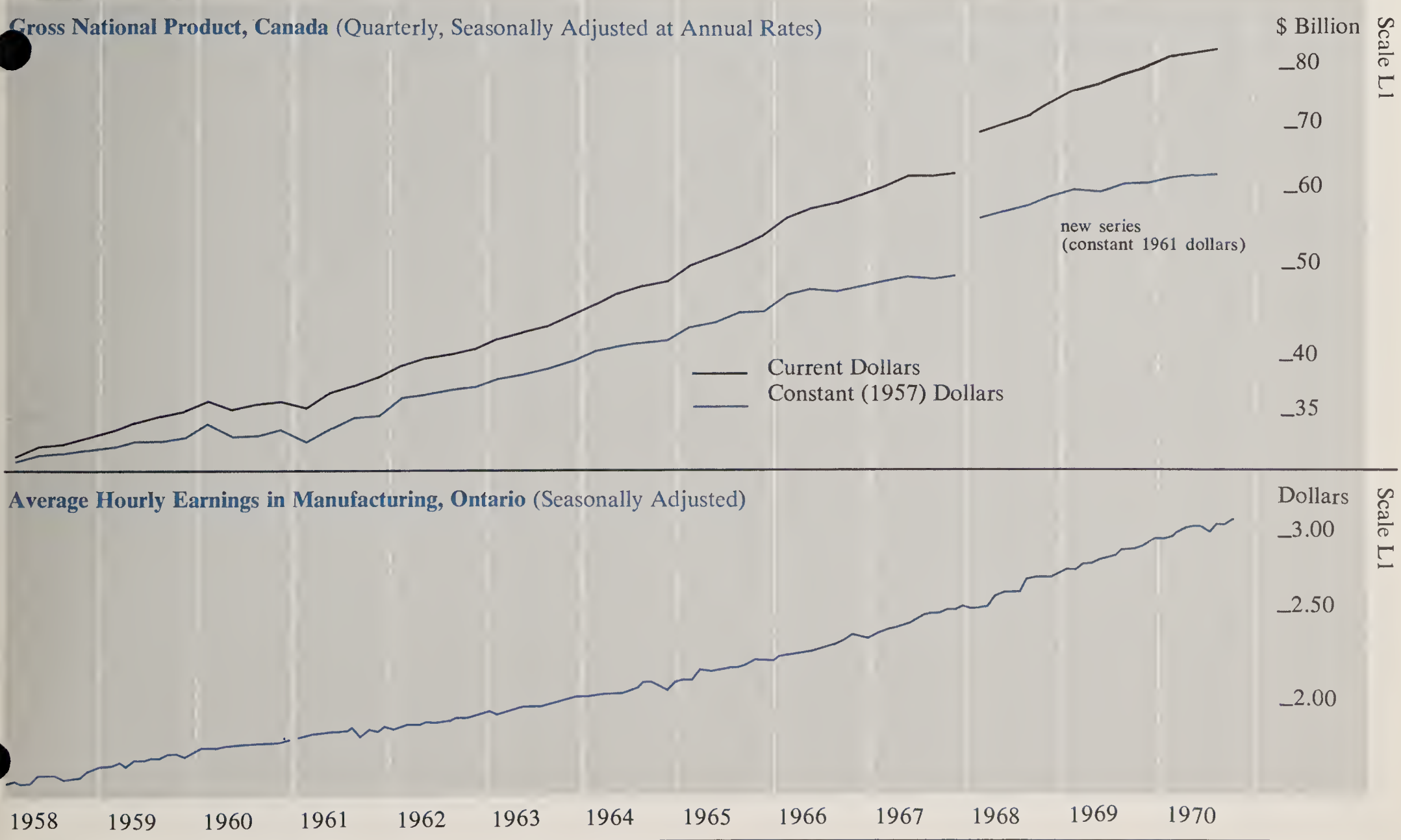




# Leading Indicators

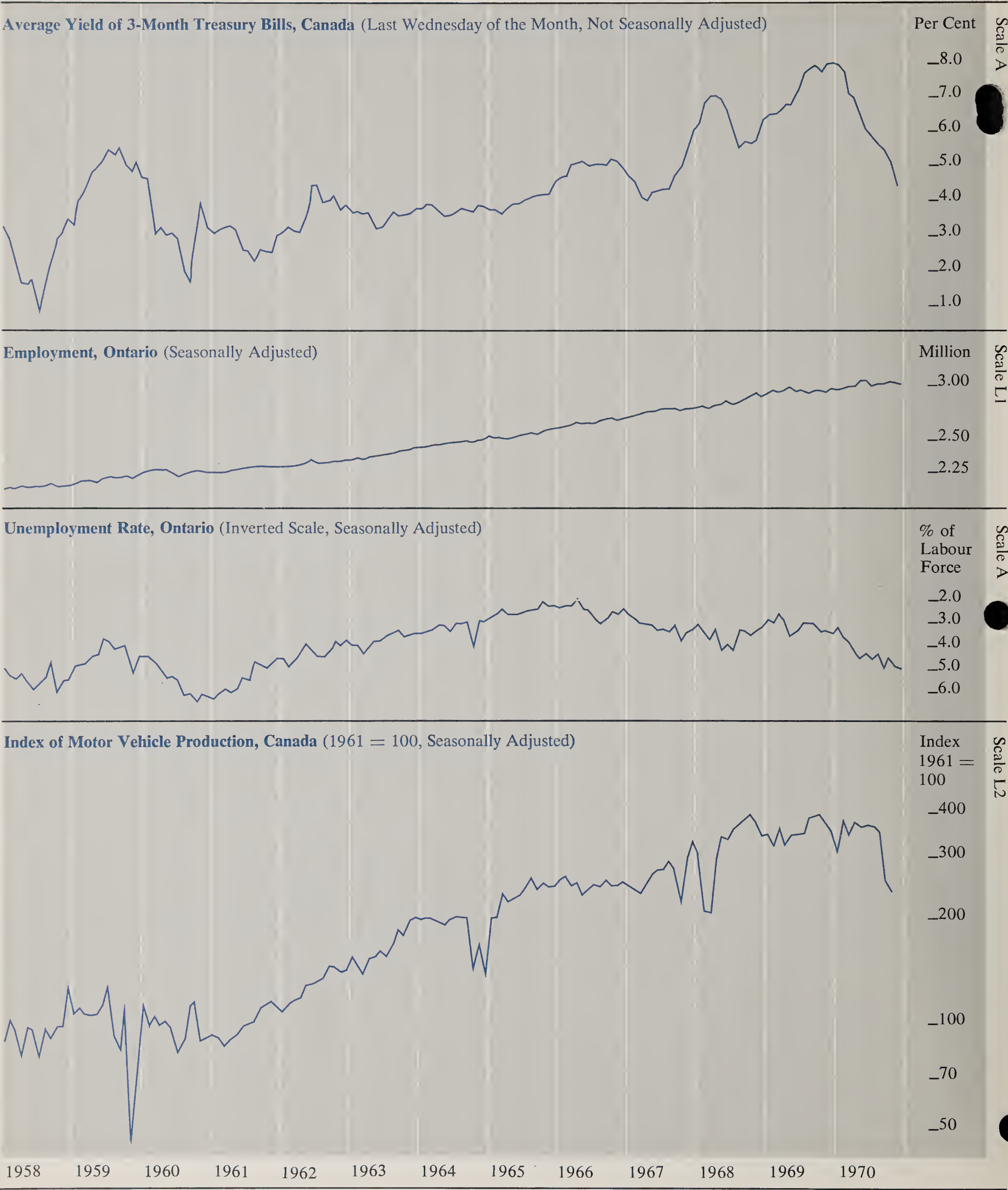


# Coincidental and Lagging Indicators





# Coincidental and Lagging Indicators





		1969					1970									
		Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
<b>Leading Indicators</b>																
Average Weekly Hours Worked in Manufacturing.																
New Orders in Manufacturing Industries <sup>c</sup>		39.9	39.4	39.6	39.7	39.5	40.0	40.3	40.4	39.3	40.1	41.0	41.0			
\$ Million		3,754	3,728	3,662	3,696	3,604	3,650	3,774	3,851	3,804	3,883	3,754	3,697	3,690		
Commercial/Institutional and Industrial Construction Contracts																
\$ Million		137.3	140.0	72.1	78.4	87.2	142.2	97.4	130.4	159.4	120.2	118.3	112.4	66.6		
Urban Housing Starts (Annual Rate)																
Money Supply <sup>c</sup>		59,100	64,700	34,800	33,600	55,700	53,900	37,200	45,200	67,500	77,500	69,200	106,000	103,800	82,300	
T.S.E. Industrial Index <sup>u</sup>		28,580	28,917	28,955	28,947	28,817	28,966	29,223	29,668	29,769	29,996	30,132	30,549	31,268		
Business Failures <sup>u</sup>		187.65	186.37	177.89	183.92	185.17	171.08	154.21	151.53	157.36	160.28	165.8	162.1	168.7	174.4	
Business Failures — Liabilities <sup>u</sup>		54	53	56	71	82	54	65	77	73	48	55	71	74	71	
		4.6	2.2	9.9	18.7	4.0	2.2	3.4	8.1	3.1	2.8	5.3	8.1	5.8	7.7	
<b>Coincidental and Lagging Indicators</b>																
Gross National Product <sup>c</sup> (Annual Rate)			80,888			82,680			83,076			84,120				
\$ Million																
Average Hourly Earnings in Manufacturing																
3-Month Treasury Bill Rate <sup>c,u</sup>		3.02	3.06	3.06	3.05	3.11	3.17	3.19	3.19	3.16	3.22	3.22	3.25			
Cheques Cashed in Clearing Centres <sup>1</sup>		7.76	7.81	7.78	7.60	7.00	6.78	6.34	5.94	5.70	5.51	5.39	5.01	4.40	4.46	
Retail Trade		6,521	6,240	6,078	6,099	6,661	6,487	6,313	6,386	6,358	6,774	7,184	7,007	6,464		
Labour Force		895	909	891	869	884	906	904	887	918	902	930	895	905	916	
Employed		3,030	3,064	3,044	3,066	3,098	3,111	3,183	3,173	3,122	3,130	3,158	3,179	3,175	3,148	
Unemployed		2,927	2,957	2,948	2,957	2,981	2,977	3,037	3,038	2,976	2,992	2,998	3,033	3,018	2,988	
Unemployed as % of Labour Force		103	107	96	109	117	134	146	135	146	138	160	146	157	160	
Wages and Salaries		3.4	3.5	3.2	3.6	3.8	4.3	4.6	4.3	4.7	4.4	5.1	4.6	4.9	5.1	
Index of Industrial Employment		1,487	1,503	1,529	1,549	1,550	1,547	1,571	1,586	1,583	1,600	1,596	1,595	1,603		
\$ Million		132.7	132.8	132.1	133.0	132.7	132.1	131.7	131.4	131.1	131.7	130.2	130.0	129.3		
1961 = 100																
Index of Industrial Production <sup>c</sup>																
Total Manufacturing <sup>c</sup>		169.3	172.0	171.1	174.4	171.5	172.4	170.5	170.2	170.0	171.0	169.1	169.3	171.5		
Non-Durables <sup>c</sup>		169.5	170.7	167.8	171.0	168.1	170.0	167.5	167.4	165.4	166.5	163.1	163.3	165.4		
Durables <sup>c</sup>		153.4	154.3	152.3	154.3	152.8	154.8	155.0	152.4	152.8	151.8	152.2	154.6	158.7		
Mining <sup>c</sup>		189.2	190.7	186.8	191.4	186.7	188.6	182.8	185.8	181.7	184.4	176.4	173.8	173.5		
Electric Power and Gas Utilities <sup>c</sup>		151.8	163.4	170.2	175.7	170.6	164.2	166.6	170.8	173.4	174.6	178.2	176.8	181.0		
Primary Energy Demand (Annual Rate)		194.6	197.0	201.0	203.0	203.0	206.4	203.7	205.1	206.1	205.9	208.4	211.4	211.3		
Exports (including re-exports) <sup>c</sup>		59.56	63.13	64.53	63.91	62.94	63.39	61.60	63.35	65.03	65.68	66.80	65.56	64.32	66.79	
Imports <sup>c</sup>		1,285.0	1,328.9	1,447.0	1,402.1	1,410.1	1,439.0	1,434.1	1,392.2	1,422.7	1,321.1	1,391.3	1,416.0	1,479.8	1,312.0	
\$ Million		1,223.2	1,215.0	1,116.8	1,230.6	1,242.6	1,191.6	1,207.1	1,182.5	1,187.5	1,162.3	1,184.5	1,066.0	1,138.0		
<b>Unclassified Indicators</b>																
Foreign Exchange Reserves <sup>c,u</sup>		2,613	2,616	2,698	2,777	2,936	3,179	3,406	3,650	3,689	3,848	3,785	3,831	3,874		
Industrial Materials Price Index <sup>c,u</sup>		267.8	271.5	272.3	272.3	275.7	274.4	273.7	271.5	270.3	268.5	269.2	267.4	266.4		
Consumer Price Index <sup>c,u</sup>		127.4	127.9	128.2	128.7	128.9	129.7	129.6	129.9	130.5	130.5	130.2	130.3	130.3	129.8	

<sup>c</sup>Statistics for Canada.

<sup>u</sup>Not seasonally adjusted.

<sup>1</sup>Ontario less Toronto.





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# Ontario Economic Review

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March/April 1971  
Volume 9, Number 2

Department of Treasury and Economics

Hon. W. Darcy McKeough, Treasurer of Ontario  
and Minister of Economics

H. Ian Macdonald, Deputy Minister

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# Ontario Economic Review

March/April 1971  
Volume 9, Number 2

## The Ontario Economy

## Reflation, Retrenchment and Reform: Britain's New Fiscal Policies

R. G. Holloway, *Economist*  
Department of Treasury and Economics

## Price Changes 1961-1970: An Economic Analysis

John Burkus, *Director, Corporate Planning and Research*  
Ontario Housing Corporation

A publication of the  
Department of Treasury  
and Economics  
Government of Ontario

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*Treasurer of Ontario and  
Minister of Economics*  
H. Ian Macdonald  
*Deputy Minister*

The *Ontario Economic Review* is prepared and edited bimonthly in the Economic Analysis Branch of the Economic and Statistical Services Division, Department of Treasury and Economics. The review presents articles of interest as well as current information on economic activity in Ontario. Signed articles reflect the opinions of their authors and do not necessarily represent the views of the Department.

Subscriptions can be obtained free of charge by writing the Editor, *Ontario Economic Review*, Department of Treasury and Economics, Frost Building, Queen's Park, Toronto 182, Ontario.

### About The Review

The feature article for the March/April edition of the *Ontario Economic Review* presents an analysis of price changes over the period 1961 to 1970.

During the course of the past few years, Canadians have been engaged in discussing the nature, causes and extent of price increases and inflation. While all aspects of price changes are not analyzed in this report, policy issues are examined in the light of historical price series. The statistical material and related analysis is contemporary to about the third quarter of 1970. In some instances data for the full year 1970 has been incorporated.

Originally this report, which is a summary of a larger study, was prepared for use within the Department; however, in view of the nature of the data, it was decided to publish the material in its present form.

The article was prepared by John Burkus, Director of Corporate Planning and Research with the Ontario Housing Corporation, and until recently a senior economist in the Economic Planning Branch, Policy Planning Division, Department of Treasury and Economics.

In a short article on Britain's new fiscal policies, R. G. Holloway of the Taxation and Fiscal Policy Branch, Department of Treasury and Economics outlines the aims and coverage of the recent U.K. tax reforms.

The material for the review of the Canadian Economy in 1970 was prepared by the Aggregate Analysis, Forecasting and Planning Section of the Economic Planning Branch.

### Indicator Charts, Pages 14-16

Fluctuations in aggregate economic activity — commonly used to define business cycles — do not necessarily correspond with fluctuations in the individual activities which make up the aggregate. Instead different indicators of economic activity may vary with respect to both their rates of growth and the timing of their peaks and troughs: some may grow more rapidly than others, some change direction sooner.

Those activities which tend to assume a direction in advance of the aggregate — because they relate to future rather than present production — are referred to as leading indicators, and are widely used to anticipate the short-run future course of the overall economy. The charts on pages 14-16 in the *Ontario Economic Review* present a number of these leading indicators, as well as several which are coincidental to or lag behind the aggregate, to provide for the reader an opportunity to make such an evaluation.

While comparisons of the timing and direction of general changes in the various indicators can readily be made, great care must be exercised in making such a comparison of the amplitude of fluctuations. Of the three vertical scales used — 'A' (arithmetic) and 'L 1' and 'L 2' (logarithmic scales with one and two cycles respectively over a given vertical distance) — only the logarithmic scales can be used to compare relative changes in different indicators. *And this applies only when all series being compared are on the same logarithmic scale.* In such a situation all parallel lines represent equal rates of growth, the exact rate of growth being determined by the slope of the line.



## The Canadian Economy in 1970<sup>1</sup>

Revised estimates of the first three quarters and preliminary estimates for the fourth quarter indicate an accelerating pattern of real growth during 1970. The gain in the fourth quarter was particularly strong. Thus, Canada's gross national product rose by 7.5 per cent, to \$84,468 million. The implicit price deflator rose by 4.1 per cent. Although this was less than the 4.7 per cent price increase in 1969, it was still one of the largest experienced in recent years. After discounting the effect of price increases, the physical volume of production rose by 3.3 per cent.

It is likely that the fiscal and monetary policies adopted by the federal government in 1969 contributed to the slowing in the growth of incomes and domestic demand in the first half of the year. Also, these policies of restraint contributed to a moderation in price increases except in the first quarter when the index rose by 2.0 per cent. Similarly, the easing of restraints in the early part of 1970 appears to have stimulated a recovery of demand in the second half of the year. However, the moderate growth of 1970 would not have been achieved, without the outstanding performance of the export sector. The spectacular growth of exports in the first quarter, and their continuing strength through the remainder of the year provided by far the greatest stimulus to the economy in 1970.

Although the rate of price increase declined during the year, cost pressures do not appear to have eased. Corporation profits declined for a number of reasons including numerous work stoppages, and the adverse effect on export-oriented industries of the appreciation of the Canadian dollar. Increases in employment were insufficient to absorb the rapidly increasing labour force, pushing unemployment rates to 5.9 per cent.

### Gross National Product

In the fourth quarter the total value of production rose by \$1,388<sup>2</sup> million dollars, or 1.6 per cent. While this was not a spectacular rate of growth, it is more impressive when the price factor is eliminated, yielding a real rate of growth of 1.5 per cent (6 per cent on an annual basis).

Earlier estimates had indicated substantial strength in the first quarter, the result of very strong export demand. However, revisions to the implicit price deflator, including a correction to the implicit price index of exports, now indicate that in spite of the boost from

## Gross National Product – Quarter to Quarter Percentage Changes<sup>1</sup>

	1969				1970			
	I Q	II Q	III Q	IV Q	I Q	II Q	III Q	IV Q
Gross National Product (Current dollars)	3.1	1.3	2.4	2.1	2.1	1.4	1.4	1.6
Gross National Product (Constant 1961 dollars)	1.6	—0.7	2.1	1.4	0.1	0.7	0.6	1.5
Implicit Price Index	1.5	2.0	0.3	0.7	2.0	0.6	0.8	0.1
Implicit Price Index (Excluding nature of physical change in inventories)	1.4	1.7	0.9	0.6	1.4	0.8	0.8	0.4

a healthy export performance real growth in the first quarter was only 0.1 per cent. Thus, the accelerated growth of the subsequent quarters in the face of a lack of further growth in the export sector indicates a resumption of domestic demand. The recovery in the latter part of the year was aided by an exceptionally strong performance of investment, which increased by 4.4 and 2.8 per cent in the third and fourth quarters, after having experienced marginal declines in the first two quarters. Government expenditure on goods and services was another important sustaining force throughout the year. The 1970 increase of 15.5 per cent was the highest since 1966. Although consumer expenditure did not experience such a dramatic increase, it did rise in the last three quarters.

### Prices

The year-to-year change in the implicit price index was 4.1 per cent. While still very high by historical standards, this was a definite improvement over the 4.7 per cent price increase experienced in 1969. Although there is a conceptual difference between a currently weighted price index such as the implicit price index and base weighted price indexes such as the consumer price index and the general wholesale price index, these latter indexes exhibited the same pattern as the former — in fact showing even more substantial declines.

While the price indexes for most major categories of final expenditure recorded lower increases, the deceleration of the overall implicit price index was mainly the result of moderation from the second quarter onward in the rise of the index for personal expenditure on goods and of that for exports.

The implicit price index for exports rose by 3.3 per cent. The increase was concen-

trated mainly in the first quarter, which showed an exceptionally strong rise of 2.1 per cent. During the rest of the year there was very little rise in export prices. For many commodities, whose prices are determined in world markets, the freeing of the exchange rate in June 1970 caused a lowering of the price received by Canadian producers. However, the full implications of the appreciation of the Canadian dollar on domestic producers cannot be determined until the exchange rate is repegged. As had been expected, the increased value of the dollar eased the rate of gain of import prices.

The implicit price index for total personal expenditure rose by 3.2 per cent — a significant deceleration from the increase of 4.1 per cent recorded in 1969. Expenditure on durables was the only sector not experiencing a decline. However, the increase here was concentrated in the first quarter with the rest of the year showing no change. Expenditure on non-durables eased primarily because of declining food prices. This was the result of lower prices of food imports and the intense competition among large retail stores in the latter part of the year. While expenditure on services continued to rise at a higher rate than that of the other consumer sectors, an easing of rent prices reduced the increase to 4.4 per cent from 6.5 per cent in 1969.

### Consumption

Consumer expenditure on goods and services increased by 5.3 per cent, after an increase of 9.8 per cent in 1969. Since consumption expenditures represent approximately 60 per cent of Canada's gross national product, the influence that a 46 per cent reduction in the rate of growth of this component has on aggregate demand is obvious. As was expected, the principle weakness occurred in

<sup>1</sup>Details concerning the performance of the Canadian economy in 1970 were obtained from D.B.S. National Income and Expenditure Accounts, Fourth Quarter and Preliminary Annual, 1970.

<sup>2</sup>Unless otherwise stated, all figures are seasonally adjusted at annual rates.



## Selected Implicit Price Indexes — Quarter to Quarter Percentage Changes

	1969				1970			
	I Q	II Q	III Q	IV Q	I Q	II Q	III Q	IV Q
Personal expenditure on consumer goods and services	1.1	1.3	0.9	0.6	1.6	0.4	0.2	—0.1
Government current expenditure on goods and services	—0.5	4.6	2.3	1.6	—1.6	3.0	1.9	0.9
Business gross fixed capital formation	1.8	1.5	0.7	0.6	1.0	0.4	0.4	1.4
Residential construction	2.3	1.8	—0.7	—	1.2	1.2	1.2	1.7
Non-residential construction	2.6	1.8	1.7	2.1	0.6	—0.1	1.0	1.3
Machinery and equipment	0.8	1.0	0.9	0.1	1.2	0.8	—0.3	0.3
Exports	1.3	1.2	—	0.6	2.1	0.4	0.1	—
Imports	0.2	1.2	1.5	0.8	0.7	0.5	—0.8	—0.6
Gross national expenditure	1.5	2.0	0.3	0.7	2.0	0.6	0.8	0.1
Gross national expenditure excluding value of physical change in inventories	1.4	1.7	0.9	0.6	1.4	0.8	0.8	0.4

Source: DBS, National Income and Expenditure Accounts, Fourth Quarter and Preliminary Annual, 1970.

the purchases of consumer durables. It is with the more expensive durable goods items that the consumer has the greatest scope for discretionary spending, and 1970 saw a reduction in this area. For example, outlays on new passenger cars fell by 17 per cent. The decline in new car purchases was especially strong in the first quarter, gradually recovering in the second and third quarters but dropping again in the final quarter when sales were affected by the strike at General Motors. Other durable goods that showed declines were recreation equipment and home appliances.

The demand for semi-durable goods was also sluggish, especially for such items as clothing and footwear. The slowing of demand for services was largely due to the further extension of the medicare program which shifted most medical expenses from the personal sector to the government sector,

and contributed to the hefty increase of 15.5 per cent in government expenditure. Outlays on non-durable goods were supported by accelerated rises in electricity and fuel which experienced substantial increases in export demand over the previous year.

#### Investment

Investment for the year increased at a rate much in excess of what earlier statistics had indicated. This was due to the fact that the quarterly accounts are based on indicators, and in a year of change such as 1970, they were not very sensitive to the changing pattern of investment. Total gross fixed capital formation increased by 4.2 per cent. Government capital expenditures increased by 6.6 per cent, to \$3,252 million, while business gross fixed capital expenditure increased by a lesser 3.7 per cent. However, this gives a somewhat misleading picture since the average was pulled down substantially by an 8.0

per cent decline in residential construction. Business fixed investment excluding housing rose by 8.0 per cent, to a level of \$11,172 million. Business spending on non-residential construction was up 10.1 per cent, while expenditures on machinery and equipment rose by 6.2 per cent.

#### Income

Wages, salaries, and supplementary labour income again grew at a faster rate than the gross national product, up 8.9 per cent while GNP rose by 7.5 per cent. Higher average earnings were responsible for most of the increase in labour income. Service-producing industries absorbed most of the increase in employment which resulted in faster income increases in this sector than in the goods-producing sectors. The slower increases in the goods-producing industries resulted from slower growth due to strikes. Thus, wages in that sector only increased by 5.6 per cent. The largest increase occurred in mining, where a 17.5 per cent increase reflected the resumption of production following strikes in 1969.

Preliminary estimates indicate that corporation profits before taxes declined by 6.2 per cent. Corporation profits for the first three quarters remained essentially unchanged from the 1969 level. However, the 11.7 per cent drop in the strike-affected fourth quarter greatly influenced the year's performance. The rise of 9.3 per cent in capital consumption allowances cushioned this somewhat, so that gross profits (which include provisions for depreciation) declined by only 0.9 per cent.

#### Exports and Imports

The greatest stimulus for the Canadian economy in 1970 originated in the foreign sector. These gains were concentrated in the first quarter, accounting for all of the increase in total demand. For the remainder of the year exports remained at about the same level, increasing by 13.5 per cent for the year as a whole. Increases were especially strong in metals and in cereals. On the whole the strength was in the raw materials sector. Food, feed and beverages increased by 28.0 per cent, and inedible crude materials increased by 24.3 per cent. On the other hand, inedible fabricated materials increased by only 13.5 per cent and inedible end products by only 4.2 per cent. A notable feature of this expansion is the fact that it was directed primarily at countries other than the United



### Income (Canada) — Quarter to Quarter Percentage Changes

	1969				1970			
	I Q	II Q	III Q	IV Q	I Q	II Q	III Q	IV Q
Wages and salaries	3.7	2.3	2.6	2.5	3.0	0.6	1.7	2.4
Personal income	2.1	3.2	3.2	1.7	1.7	1.1	1.4	2.4
Personal disposable income	1.8	2.0	3.2	1.0	2.0	-0.4	1.6	2.3
Corporation profits	3.0	-0.9	-6.3	0.2	2.0	-4.2	2.5	-11.7

Source: DBS, National Income and Expenditure Accounts, Fourth Quarter and Preliminary Annual, 1970.

States, which increased its imports from Canada by only 3.5 per cent. Canadian exports to the European Economic Community increased by 40.9 per cent, to the United Kingdom by 34.7 per cent, and to Japan by 27.1 per cent.

Because of the depressed level of economic activity in Canada, imports of goods and services virtually halted their rapid rate of increase of the preceding years. The greatest decline was in automobiles and parts, a result of both the auto workers strike and lower overall sales.

#### Productivity Trends

In a recent statement on preliminary productivity trends for 1970 the Dominion Bureau of Statistics reports that in the private sector of the Canadian economy productivity rose by 3.1 per cent. This represents a significant improvement over the 2.2 per cent increase during 1969, however it is still below the 1965-1969 average annual increase of 3.5 per cent.

In the important manufacturing sector, productivity, defined in terms of output per man-hour, rose by only 1.3 per cent, the smallest increase in any year during the past decade. In 1969, the increase was 3.6 per cent and during the period 1965-1969, the average annual increase was 2.2 per cent. Services, on the other hand, showed a much better performance, with a 2.5 per cent gain last year compared with a 0.6 per cent rise in 1969. For 1965-1969, the average annual increase was 2.2 per cent.

DBS notes that while there was some overall improvement in the private sector the

3.1 per cent gain in output per man-hour was still below the average annual growth of the nineteen sixties. For commercial industries as a whole total output rose by 2.4 per cent and the number of persons employed by six-tenths of one per cent. Man-hours worked declined by six-tenths of one per cent. While output per man-hour rose 3.1 per cent, output per person employed rose 1.9 per cent.

In the manufacturing sector, output declined in 1970 by seven-tenths of one per cent while the number of persons employed fell by 1.4 per cent and man-hours worked by 2.0 per cent. Output per person employed rose eight-tenths of one per cent and output per man-hour increased by 1.3 per cent. In the services sector, total output for commercial services-producing industries rose 4.0 per cent in 1970 while employment increased 3.0 per cent and man-hours worked by 1.5 per cent. Output per person employed showed a 1.0 per cent increase and output per man-hour rose 2.5 per cent. In the agricultural sector total output declined by 5.3 per cent, the number of persons employed fell by 4.5 per cent and man-hours worked by 5.5 per cent. Output per man-hour in agriculture showed a 6.2 per cent gain, compared with a gain of 9.3 per cent last year. The five-year average annual gain in 1965-1969 was 1.6 per cent.

While still leaving room for improvement, Canada's productivity performance last year was better than that of the United States. The U.S. private sector showed only a 0.9 per cent gain in output per man-hour. However, Canadian manufacturing fared only slightly better than U.S. manufacturing with the U.S.

sector showing a 1.1 per cent improvement compared with the 1.3 per cent productivity increase in Canada.

#### Income Distributions — 1969

In a recent statement on preliminary estimates of income distribution by size in Canada, the Dominion Bureau of Statistics reports that between 1967 and 1969, the average income of families (two or more persons living together and related by blood, marriage or adoption) increased by approximately 17 per cent to \$8,876. The average income of unattached individuals (persons living by themselves or rooming in a household with no relationship to other household members) increased by about 23 per cent to \$4,003 during the same period. However, these increases were partially absorbed by the substantial rise in the consumer price index over the two year period. These income changes are indicated by preliminary analysis of the 1970 survey of consumer finance which sampled some 12,000 households across Canada.

Average incomes in Ontario were highest while those in the Atlantic provinces were lowest in Canada, however average family income in these provinces increased at a slightly faster rate. Units headed by males gained 18 per cent and those headed by females, 11 per cent.

A significant shift in the distribution of incomes is also indicated by the fact that the number of families receiving less than \$5,000 dropped from 29.7 per cent in 1967 to 24.7 per cent in 1969 and those receiving \$10,000 or more increased from 22.6 per cent in 1967 to 33.1 per cent in 1969. A similar shift occurred in the incomes of unattached individuals.

The preliminary estimates also include some analysis of low income families and unattached individuals. Using the low income cut-offs adopted by the Economic Council of Canada in its Fifth Annual Review, and adjusting them for the rise in consumer prices, the estimates indicate that the incidence of low incomes among families dropped from 18.6 per cent in 1967 to 17.3 per cent in 1969 and that of unattached individuals from 39.0 per cent to 35.5 per cent in the same two years.



# Reflation, Retrenchment and Reform: Britain's New Fiscal Policies

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The two budgets presented by Britain's new Conservative Chancellor, Mr. Anthony Barber, in the past year represent a radical reversal of the ousted Labour Government's policies of expanding the public sector while restraining the growth of private consumption, and constitute the beginning of a massive exercise in retrenchment and reform.

Further, while the October budget was broadly neutral in its economic impact, the March 1971 budget is mildly reflationary, particularly when combined with an easing of monetary policy. Bank rate was reduced from 7 to 6 per cent on April 1 to stem a very large (and, for the most part, unwanted) inflow of dollars and a new monetary philosophy is emerging with a shift from the existing system of ceilings and guidelines for bank advances to a broader liquidity ratio control. An easing of overseas investment restraints has also begun.

## RETRENCHMENT

A fundamental review of the role of government and of public authorities has been launched with the objects of concentrating and reducing their activities, revising arrangements which have been overtaken by social and economic progress, and releasing manpower for more productive work in the private sector. This means not only less intervention in and less financial assistance to agriculture and industry but also a considerably more selective approach in the provision of social services. It also means hiving off certain activities from government to private enterprise.

Possibly more important, however, is the package of immediate and prospective tax reform which is intended to both reduce and simplify taxation. The Chancellor's recent statements have the great merit of disclosing fiscal plans for several years ahead. This gives business the opportunity to plan ahead and create much-needed confidence.

## REFORM AIMS

The Chancellor's reform aims are:

*First*, to reduce the excessive burden of taxation.

*Second*, to simplify the system, to reduce the number of taxes and to make them more intelligible and easier to work.

*Third*, to encourage initiative, enterprise and effort.

*Fourth*, to encourage people to save more by reducing fiscal penalties on savings.

## Tax reductions

Taking both the October and March budgets together, the tax reductions enacted and proposed comprise:

### (a) Business taxes

- selective employment tax (a tax on the use of labour in service industries) halved;
- corporation tax cut from 45 per cent to 40;
- new system of depreciation allowances replacing investment grants, enabling 60 per cent of expenditure on new or secondhand plant and machinery to be written off in the year in which the expenditure is incurred and 25 per cent of the reducing balance to be written off successively in later years;
- free depreciation for ships and for capital expenditure on new machinery and plant (other than mobile equipment) for use for industrial purposes in development areas;

### (b) Taxes on personal income

- income tax on earned income (wages, salaries, profits, etc.) reduced from 32.5 per cent to 30;
- top rate of combined income tax and surtax (a graduated tax on high incomes) reduced from 91.25 per cent to 75.4 on earned income;
- substantial cuts for parents (who also get higher family allowances);
- higher pension contribution limits for those not in pensionable employment;
- higher income limits for dependent relative deductions;
- higher exemptions for old people (who will also get higher pensions);
- option for working wives to have their earnings taxed as if they were single instead of having these earnings treated as the husband's income for surtax purposes;
- higher limits for certain forms of saving exempt from income tax;
- the higher rate of tax on investment income to be abolished where the amount is small;
- investment income of young children generally no longer to be taxed as income of parent;

- child's investment income derived from parent no longer to be treated as parents' income if child over 18;

### (c) Taxes on capital

- exemption limit for capital gains tax raised, eliminating liability for a quarter of those previously taxable;
- deemed realization of capital gains (on death or in hands of discretionary trust) abolished;
- estate duty exemption raised, reducing the number of dutiable estates by nearly a quarter;
- payment of death duties on unincorporated businesses and certain unquoted shares to be spread over eight years;

### (d) Other taxes

- stamp duty on mortgages abolished.

## Tax simplification

The measures to simplify the tax system, to reduce the number of taxes and to make them more intelligible and easier to work comprise:

- replacement of purchase tax and selective employment tax by a value-added tax in 1973;
- merger of income tax and surtax in 1973;
- conversion of income tax deductions from wages and salaries from cumulative to non-cumulative basis (under study);
- statement of basic tax as tax on earned income with surcharge on investment income, instead of taxing investment income at the "standard rate" and applying "earned income relief" to 95 per cent of incomes;
- restriction of attribution of income to head of family where income actually received by wife or child;
- distinction between short-term and long-term capital gains abolished;
- deemed realization of capital gains abolished;
- higher retentions of "close" (closely-held) company profits permitted before imposition of personal tax on deemed distributions.

## Work incentives

The measures to encourage initiative, enterprise and effort comprise:

- lower rate of corporation tax;
- lower rate of income tax;
- drastic cut in surtax on earned incomes.



### Savings incentives

The measures to encourage people to save more by reducing the fiscal penalties on savings comprise:

- lower rate on short-term capital gains;
- reduced taxation of capital at death;
- higher limits on tax-free forms of saving;
- abolition of stamp duty on mortgages;
- reform of corporation tax to increase after-tax shareholder income.

### CORPORATION TAX REFORM

The Government intends to reform the structure of corporation tax so as to remove the discrimination against distributed profits which exists under the present "classic" system of completely separating corporation and shareholder taxation. This discrimination is said to distort the working of market forces and so tend toward the misallocation of scarce investment resources.

Of the various possible systems of company tax which would achieve this end, the Government considers that the one which would be most appropriate on domestic grounds would be the system adopted by Germany and usually referred to as the two-rate system.

Under a two-rate system, distributed profits would be liable to corporation tax at a lower rate than undistributed profits. In addition, distributed profits would be paid under deduction of income tax and this tax would, as at present, be paid over to the Revenue and would be an advance payment of the shareholder's own eventual tax liability.

The two-rate system maintains a firm line of demarcation between the corporation tax liability of the company and the income tax liability of the shareholder. The Government regards this demarcation as an advantage and

as likely to lead to greater simplicity in the administration of the tax. At the same time, it substantially avoids the double taxation of distributed profits — the feature of the existing system which has tended to divorce the interests of the company and the shareholder.

The Government will also consider a change to an "imputation" (tax credit) system under which all corporate profits bear the same rate of tax but part of this tax can be set against the shareholder's tax liability if the profits are distributed. This is the French system.

Either of these methods should facilitate the flow of funds to those sectors which can use them most profitably.

Britain will not revert to the pre-1965 type of integration which would discriminate against British-based international companies by not permitting repayment of foreign tax to U.K. shareholders.



# Price Changes 1961-1970: An Economic Analysis <sup>6</sup>

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## SUMMARY

Marked upward movements in prices began in 1966 and have generally accelerated since that time. During 1969 the Canadian Consumer Price Index increased by 4.5 per cent; the Wholesale Price Index by 4.6 per cent and the National Accounts Implicit Price Index by 4.7 per cent. Over the course of 1970 price rises have moderated as compared with 1969.

Price increases since 1964 have been significantly higher than 2.0 per cent per annum — a goal suggested by the Economic Council of Canada.

A significant proportion of the rise in prices since 1961 as measured by the Implicit Price Index is attributable to increases in the residential construction and government expenditure sections. Personal expenditure, machinery and equipment, as well as prices of exports and imports all increased at a rate less than that for the Implicit Price Index as a whole during the period 1961 to 1970.

Price performance in Canada compares favourably with that of most of our major trading partners. Although Canadian prices over the period 1961-1970 rose by more than prices in the United States, during the past two years the American Consumer Price Index rose more rapidly than that in Canada. For the first nine months of 1970, U.S. consumer prices increased by 6.0 per cent while Canadian prices rose by 3.8 per cent as compared with the same period in 1969.

Price increases have not been uniform across Canada. Slow growth areas, in spite of high unemployment levels, experienced higher price increases than in Ontario.

The traditional concept that higher levels of unemployment will lead to greater price stability may prove to be socially unacceptable. Results of this study suggest that during the course of the past few years, significantly higher rates of unemployment have occurred before reasonable price stability was attained. In the current economic environment, the extent of regional unemployment which would result from stern anti-inflationary measures could be in the order of 10 per cent.

The rapid rise in U.S. prices and a parallel but generally greater price increase in Canada during the period 1961-1970 suggest that Canadian price increases are linked to changes in American price levels.

Although selective tax and other policies to curtail price increases have been advocated by the federal government, recognition should be given to the fact that:

- a) price increases in Ontario have been smaller than in other provinces and regions of Canada;
- b) prices in the export sector (which is important in the Ontario economy) have not increased as rapidly as either the Consumer Price Index or the Implicit Price Index;
- c) investment in production facilities should not be discouraged since these lead to improved productivity and hence to better price performance.

Prices have an important allocative function in our economy in that they signal both shortages and surpluses. If artificial restraints hinder price and wage changes for other than very short periods, serious long-run distortions may result in the allocation of the factors of production.

## INTRODUCTION

There are in Canada three broad indexes which measure price movements. The best known and most often used is the Consumer Price Index. The two other important indexes are the Wholesale Price Index and the Implicit Price Index. The latter is used in national accounts data. While each of these indexes is not a fully satisfactory measure of price movements, it is generally agreed that they do provide a good indication of price changes over time.

Table 1 shows that the Consumer Price Index for Canada exhibited a sharp upward movement beginning in about 1966. Prior to that time the annual percentage change in the Consumer Price Index was 2.5 per cent or less. In 1966 prices rose by 3.7 per cent, declined slightly in the following year, and rose again in 1968 by just over 4 per cent per year. During the course of 1969 the CPI continued to exhibit a strong upward movement, and the change over the previous year was 4.5 per cent. Price increases began to moderate in 1970 and the annual rise in consumer prices declined to 3.3 per cent.

The table also indicates that over the period 1961-1970 the Implicit Price Index increased by 32.7 per cent as compared to the Consumer Price Index which rose by 29.7 per cent. Although the Wholesale Price Index lagged slightly behind, it increased in the same period by 22.8 per cent.

Much of the recent debate and discussion relating to price increases and the appropriate policies to alleviate them, has been concerned with the extent to which Ontario was a net contributor to upward price movements. It has been suggested that selective policies must be adopted to curtail price increases in Ontario, while at the same time ensuring that slower growing regions in Canada are not held back. The following sections discuss the nature and forces underlying the price changes which have been referred to, as well as examining some of the policy implications for Ontario which stem from these changes.

**Table 1 — Index of Consumer Prices, Wholesale Prices and Implicit Prices, Canada, 1961-1970 (1961 = 100)**

	CPI		WPI		IPI	
	Index	Annual % Change	Index	Annual % Change	Index	Annual % Change
1961	100.0	—	100.0	—	100.0	—
1962	101.2	1.2	102.9	2.9	101.4	1.4
1963	103.0	1.8	104.8	1.8	103.3	1.9
1964	104.8	1.7	105.2	0.4	105.8	2.4
1965	107.4	2.5	107.3	2.0	109.5	3.5
1966	111.4	3.7	111.2	3.6	114.5	4.6
1967	115.4	3.6	113.2	1.8	118.4	3.4
1968	120.1	4.1	115.7	2.2	122.6	3.5
1969	125.5	4.5	121.0	4.6	128.4	4.7
1970	129.7	3.3	122.8	1.5	132.7 <sup>1</sup>	3.8

<sup>1</sup>First three quarters of 1970.

Source: DBS, Prices and Price Indexes.

DBS, National Income and Expenditure Accounts, 1926-1968.



### Definition and Theories of Inflation

Although there are many definitions of inflation one of the most succinct and useful is one which states that inflation occurs when money incomes outstrip the sustainable rate of growth. Perhaps a more encompassing definition is one which suggests that inflation is a process resulting from competition in attempting to maintain total real income, total real expenditure, and/or total output at a level which has become physically impossible.

A review of the recent literature which analyzes various theories of inflation suggests that the traditional approach of labelling inflation as either demand-pull or cost-push is misleading. Much of the current theoretical investigation into the nature and causes of inflation suggests that earlier approaches were simplistic. Indeed, depending on the base period selected, almost any theory of inflation can be propounded. Unfortunately, for the policymaker, it is essential to grasp the nature and significance of each particular type if policy prescriptions are not to be for the wrong disease.

For the purposes of clarity, brief descriptions of various types of inflations are given:

*Demand-pull theory* — assumes prices rise in response to an increase in aggregate demand.

*Cost-push theory* — assumes that inflation is caused by various factors of production trying to increase their relative share of total product by raising prices.

*Demand shift or structural theory* — assumes that structural or institutional rigidities pre-

vent a quick response to changes in demand. That is, labour or capital immobility prevents the smooth reallocation of resources to meet changing demand needs.

Some economists have suggested that an indication of the type of inflation prevalent at any given time can be determined from examining the changing distribution of national income to various groups in society.

Table 2 shows the distribution of net national income at factor cost. The average proportion of net national income at factor cost during the period 1961 to 1969 for each of the various groups is as follows: wages, salaries and supplementary income 69.6 per cent; corporation profits before taxes (less dividends paid to non-residents) 12.8 per cent; net income of non-farm unincorporated business including rents 8.4 per cent; and other 9.2 per cent.

On the basis of these averages, it is seen that prior to 1967 wages, salaries and supplementary labour income as a percentage of national income were lower as a proportion of the total than the nine-year average. Since 1967 there has been an upward movement in this proportion, and for the most recent full year period in which data is available, this component accounted for 72.2 per cent of the total net national income. Profits, as a proportion of net national income at factor cost, during these last three years have been lower than their nine-year average. The same has been true for the proportion of net national income at factor cost going to non-farm unincorporated business.

The evidence in Table 2, while not conclusive, tends to suggest that in the aggregate those receiving wages, salaries and supplementary labour income have improved their share of net national income and that this has been at the "expense" of all other incomes.<sup>1</sup>

### Sectoral Analysis

The Implicit Price Index provides one of the best indicators of price movements by sector. Unfortunately, this series is available only on a national basis. In Table 3 it can be seen that during 1969 and 1970 government expenditures, non-residential construction and residential construction contributed to upward price movements. In each of the full years shown in the table, except 1968, prices in the residential construction sector moved upward at substantially higher rates than did the index as a whole. The same is true without exception for government expenditure.

The most moderate price behaviour in recent years has taken place in the machinery and equipment sector. Exports have also tended toward moderate upward price movements. Both of these sections are important in the Ontario economy and their past price performance should be taken into account in arriving at appropriate long-run, anti-inflationary policies.

Table 4 shows that prices of domestic exports have not increased as rapidly as either the Consumer Price Index or the Implicit Price Index. Import prices have increased at somewhat slower rates relative to exports. Moreover, import prices have

**Table 2 — Percentage Distribution of Net National Income at Factor Cost, Canada, 1961-1970<sup>1</sup>**

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Wages, salaries and supplementary labour income	69.3	68.2	67.6	67.8	68.8	69.3	71.6	71.5	72.2	73.5
Corp. profits before taxes — less dividends paid to non-residents	11.9	12.6	13.0	14.1	14.1	13.2	12.0	12.2	11.7	10.5
Net income of non-farm unincorporated business including rents	9.6	8.8	9.0	8.6	8.4	7.9	8.0	7.8	7.4	7.1
Other	9.2	10.3	10.4	9.4	8.8	9.6	8.4	8.5	8.8	8.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

<sup>1</sup>First three quarters of 1970.

Note: Data may not add to 100 because of rounding.

Source: DBS, National Income and Expenditure Accounts, 1926-1968.

DBS, National Income and Expenditure Accounts.

<sup>1</sup>A different view is expressed in an Organisation for Economic Co-operation and Development report (Economic Outlook, Dec. 1970) which suggests that wage rates have lagged behind increases in production and profits by some

three years and that the recent acceleration in pay rates constitutes "catching up". Table 2 which examines changes in the distribution of net national income at factor cost, does not support such a conclusion.



**Table 3 – Implicit Price Indexes, Canada, 1961-1970 (1961 = 100)**

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 <sup>1</sup>
Personal expenditure	100.0	101.4	103.0	104.3	106.5	110.0	113.7	118.1	122.9	126.8
Government expenditure	100.0	102.6	106.3	110.1	116.6	124.3	132.9	142.4	154.9	161.0
Business gross fixed capital formation	100.0	101.4	103.7	106.7	111.5	116.8	118.2	119.5	125.1	128.4
Residential construction	100.0	100.0	102.2	106.9	112.3	119.2	126.6	129.2	136.0	139.2
Non-residential construction	100.0	100.9	103.1	104.3	110.4	117.6	118.2	120.1	127.7	132.1
Machinery and equipment	100.0	103.0	105.3	108.9	112.1	114.9	114.2	113.6	116.5	119.2
Exports	100.0	103.2	104.5	106.9	108.5	111.7	113.7	115.3	118.0	118.9
Imports	100.0	104.4	106.2	107.4	107.6	109.4	111.6	113.6	116.8	119.3
G.N.E.	100.0	101.4	103.3	105.8	109.5	114.5	118.4	122.6	128.4	132.7

**Implicit Price Indexes, Annual Percentage Change**

	1962/61	1963/62	1964/63	1965/64	1966/65	1967/66	1968/67	1969/68	1970/69 <sup>2</sup>
Personal expenditure	1.4	1.6	1.3	2.1	3.3	3.4	3.9	4.1	3.5
Government expenditure	2.6	3.6	3.6	5.9	6.6	6.9	7.1	8.8	5.1
Business gross fixed capital formation	1.4	2.3	2.9	4.5	4.8	1.2	1.1	4.7	3.0
Residential construction	—	2.2	4.6	5.1	6.1	6.2	2.1	5.3	2.4
Non-residential construction	0.9	2.2	1.2	5.8	6.5	0.5	1.6	6.3	4.4
Machinery and equipment	3.0	2.2	3.4	2.9	2.5	—0.6	—0.5	2.6	2.7
Exports	3.2	1.3	2.3	1.5	2.9	1.8	1.4	2.3	1.0
Imports	4.4	1.7	1.1	0.2	1.7	2.0	1.8	2.8	2.7
G.N.E.	1.4	1.9	2.4	3.5	4.6	3.4	3.5	4.7	3.8

<sup>1</sup>First three quarters of 1970.<sup>2</sup>First three quarters of 1970 over first three quarters of 1969.

Source: DBS, National Income and Expenditure Accounts, 1926-1968.

**Table 4 – Price Index Numbers of Domestic Exports and Imports, Canada, 1961-1970 (1961 = 100)**

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970 <sup>1</sup>
Domestic exports										
Live animals	100.0	109.9	107.7	107.8	97.2	110.6	124.0	133.3	152.1	159.3
Food, feed, beverages and tobacco	100.0	105.4	105.1	106.0	107.8	113.8	114.9	114.1	116.4	110.2
Crude materials, inedible	100.0	104.7	106.4	107.2	111.3	116.3	118.0	122.8	128.4	140.5
Fabricated materials, inedible	100.0	101.2	102.0	103.8	105.2	108.6	110.6	116.5	123.3	129.4
End products, inedible	100.0	102.7	103.8	105.6	107.3	110.0	112.9	117.0	120.2	122.8
Total	100.0	103.3	104.0	105.4	106.8	111.2	113.4	117.4	122.6	125.7
Imports										
Live animals	100.0	111.7	111.7	101.0	107.7	121.5	121.5	128.4	137.2	133.2
Food, feed, beverages and tobacco	100.0	103.6	130.3	128.9	107.9	105.7	102.7	106.3	109.4	120.7
Crude materials, inedible	100.0	104.3	106.5	107.7	110.9	113.8	113.1	114.9	119.5	118.5
Fabricated materials, inedible	100.0	103.7	105.9	107.8	110.1	110.4	111.2	111.9	116.9	120.0
End products, inedible	100.0	105.7	106.7	108.0	109.3	111.5	114.5	117.0	120.1	120.9
Total	100.0	104.5	108.6	109.8	109.8	111.3	112.1	113.9	118.1	119.9

<sup>1</sup>First 9 months of 1970.

Note: Index converted from 1948 = 100 base.

Source: DBS, Trade of Canada – Vol. I, Summary and Analytical Tables.

DBS, Summaries of Foreign Trade, Exports and Imports.



increased by less than the Consumer Price Index. This relationship suggests that imports have tended to restrain domestic price inflation. Thus, tariff changes or the prospect of tariff changes may be an important policy tool in moderating Canadian price levels.

### Regional Price Movements

Although regional data similar to that shown in Table 3 is not available, some indication of price movements across Canada may be observed in Table 5. Unfortunately, direct inter-city comparisons cannot be made because the weighting system for each city is representative of consumption patterns of families in that area alone.

Given this limitation, the annual percentage changes in prices shown in Table 5 do suggest that sharp price increases during the past four years have not been limited to large cities alone nor confined to particular provinces.

### Canadian Price Movements in the International Context

The extent to which Canada is an "open economy" as compared with, say, the United States, is well known. For example, the im-

portance of exports in the total Canadian economy is markedly greater than in a number of other countries. This suggests that policy makers in Canada should give cognizance to external price movements and Canada's price performance relative to them. In view of the long-term secular growth of prices, not only in Canada but in all industrialized countries, marked deviations in price performance from those prevailing in countries with whom we trade may be both unnecessary and undesirable given the social cost which may be incurred.

Data published by the Organisation for Economic Co-Operation and Development in Table 6 shows that from the period beginning in 1961 to the end of the second quarter of 1970, Canadian price performance was better than that of most OECD countries. Only the United States and Germany had a lower rate of price change.

Table 7 compares price movements between Canada and the United States over the period 1961 to 1970. For each of the three price series over the full period 1961-1969, Canadian price performance has been poorer than in the United States.

While the total change in the Consumer

Price Index between 1961 and 1969 was not much greater in Canada — an increase of 25.5 per cent as compared to an increase of 22.6 per cent in the U.S., the Implicit Price Index and the Wholesale Price Index series showed marked variation between the two countries. The U.S. Wholesale Price Index increased by 12.7 per cent between 1961 and 1969 — almost one-half the Canadian increase of 21.0 per cent. Although the Canada-U.S. difference for the Implicit Price Index was not as great, the Canadian index was some six percentage points higher over the reference period.

During the last two years changes in Canadian price levels compare much more favourably with changes in the U.S. Table 7 shows that in 1968 all price indexes in Canada increased by less than the same series in the United States. The data also shows that during 1969 and 1970 prices in the United States moved upward faster than in Canada. The U.S. Consumer Price Index for the first nine months of 1970 rose by 6.0 per cent as compared with 3.8 per cent in Canada. The rate of increase in the Canadian Wholesale Price Index was about one-half that in the U.S. during the first nine

**Table 5 — Consumer Price Index, Canada and Regional Cities, 1961-1970 (1961 = 100)**

#### ALL ITEMS

	Canada	St. John's Nfld.	Halifax	Saint John	Montreal	Ottawa	Toronto	Winnipeg	Saskatoon Regina	Edmonton Calgary	Vancouver
1961	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1962	101.2	100.8	101.3	100.9	101.2	101.2	100.9	101.3	101.7	101.0	100.3
1963	103.0	102.8	102.3	102.5	102.9	102.9	102.6	102.2	102.5	102.1	101.9
1964	104.8	103.9	102.7	103.5	104.5	104.5	104.3	103.8	103.5	102.6	102.6
1965	107.4	105.5	104.6	105.1	106.7	106.3	106.9	106.1	105.2	104.1	104.5
1966	111.4	108.0	107.4	107.8	109.9	110.4	111.6	109.3	108.3	107.5	107.0
1967	115.4	110.9	109.9	111.1	114.2	113.1	114.9	113.3	111.3	111.8	111.0
1968	120.1	115.9	114.2	115.1	118.1	118.4	119.3	118.2	115.8	116.7	115.1
1969	125.5	119.3	119.5	119.8	121.8	123.1	124.1	123.1	119.7	121.5	119.0
1970	129.7	121.6	124.4	123.5	124.3	127.4	127.3	127.0	122.2	125.1	123.0
<b>Annual Percentage Change</b>											
1962/61	1.2	0.8	1.3	0.9	1.2	1.2	0.9	1.3	1.7	1.0	0.3
1963/62	1.8	2.0	1.0	1.6	1.7	1.7	1.7	0.9	0.8	1.1	1.6
1964/63	1.7	1.1	0.4	1.0	1.6	1.6	1.7	1.6	1.0	0.5	0.7
1965/64	2.5	1.5	1.9	1.5	2.1	1.7	2.5	2.2	1.6	1.5	1.9
1966/65	3.7	2.4	2.7	2.6	3.0	3.9	4.4	3.0	2.9	3.3	2.4
1967/66	3.6	2.7	2.3	3.1	3.9	2.4	3.0	3.7	2.8	4.0	3.7
1968/67	4.1	4.5	3.9	3.6	3.4	4.7	3.8	4.3	4.0	4.4	3.7
1969/68	4.5	2.9	4.6	4.1	3.1	4.0	4.0	4.1	3.4	4.1	3.4
1970/69	3.3	1.9	4.1	3.1	2.1	3.5	2.6	3.2	2.1	3.0	3.4

Source: DBS, Prices and Prices Indexes.



**Table 6 — Consumer Price Index, Selected OECD Countries, 1969 and 1970 (1961 = 100)**

	1969	1970 <sup>1</sup>	Percentage Change			
			1969			1970
			2Q/1Q	3Q/2Q	4Q/3Q	2Q/1Q
United States	122.4	128.6	1.8	1.4	1.4	1.6
Germany	123.4	127.7	0.4	0.1	0.9	0.8
Canada	125.8	129.9	1.8	1.2	0.7	0.8
Belgium	127.8	132.0	0.8	0.8	1.6	0.8
Switzerland	131.2	134.4	0.8	—	0.8	0.8
Austria	132.3	136.6	0.8	0.8	0.8	0.8
United Kingdom	135.1	143.6	1.6	0.2	1.3	2.3
Sweden	135.5	144.1	0.8	0.8	0.8	1.5
France	136.3	142.9	1.3	1.1	1.5	0.8
Italy	137.1	142.7	1.0	1.2	1.0	1.6
Netherlands	142.1	147.4	1.6	—0.3	0.9	1.4
Japan	154.0	164.4	1.8	2.3	1.3	1.4

<sup>1</sup>Second quarter of 1970.

Source: OECD Main Economic Indicators.

**Table 7 — Consumer, Wholesale and Implicit Price Indexes  
Canada and United States, Annual Percentage Changes, 1961-1970**

	CPI		WPI		IPI	
	Canada	U.S.	Canada	U.S.	Canada	U.S.
1962/61	1.2	1.2	2.9	0.3	1.4	1.1
1963/62	1.8	1.2	1.8	—0.3	1.9	1.4
1964/63	1.7	1.3	0.4	0.2	2.4	1.5
1965/64	2.5	1.7	2.0	2.0	3.5	1.9
1966/65	3.7	2.8	3.6	3.3	4.6	2.7
1967/66	3.6	2.9	1.8	0.2	3.4	3.2
1968/67	4.1	4.2	2.2	2.6	3.5	4.0
1969/68	4.5	5.4	4.6	3.9	4.7	4.8
1970/69	3.8 <sup>1</sup>	6.0 <sup>1</sup>	2.0 <sup>1</sup>	4.0 <sup>1</sup>	3.8 <sup>2</sup>	5.3 <sup>2</sup>
1969/61	25.5	22.6	21.0	12.7	28.4	22.5

<sup>1</sup>First nine months of 1970 over first nine months of 1969.<sup>2</sup>First three quarters of 1970 over first three quarters of 1969.

Source: DBS, Prices and Price Indexes.

DBS, National Income and Expenditure Accounts, 1926-1968.

U.S. Economic Indicators and Department of Commerce Survey of Current Business.

months of 1970, while the U.S. increase in the Implicit Price Index for the first three-quarters of 1970 was 1.5 percentage points higher than in Canada.

### Price Changes, Interest Rates, and the Money Supply

During the course of the past year, attention was focused on the movement of interest rates and their relationship to price changes.

Table 8 shows the relationship between the Consumer Price Index, the yield on federal government bonds and interest on conventional mortgages.

The table shows that between 1961 and 1965 the Consumer Price Index increased more rapidly than did yields on federal government bonds or interest rates for conventional mortgages. After 1965 both the yield on federal government bonds and the rate of

interest for conventional mortgages began to move sharply upward. By the following year the yield index of federal government bonds was higher than the Consumer Price Index. After 1967 both the yield on federal government bonds and interest on conventional mortgages moved upward at accelerated rates, so that the Consumer Price Index was outpaced in 1968, 1969, as well as during 1970.

**Table 8 — Consumer Price Index,  
Bond Yields and Mortgage Interest Rates,  
Canada, 1961-1970 (1961 = 100)**

	Consumer Price Index	Federal Govern- ment Bonds	Conven- tional Mortgages
1961	100.0	100.0	100.0
1962	101.2	101.2	99.6
1963	103.0	100.8	99.6
1964	104.8	102.6	99.6
1965	107.4	103.2	100.3
1966	111.4	112.7	109.4
1967	115.4	117.6	115.3
1968	120.1	133.7	129.6
1969	125.5	150.1	140.6
1970	129.7	156.6	149.3

Source: DBS, Prices and Price Indexes.

Canadian Housing Statistics.

Bank of Canada Statistical Summary.

It should be emphasized that while recent annual rates of change for federal government bond yields and interest on conventional mortgages have been substantially greater than for the Consumer Price Index, the absolute differences between bond yields, interest rates and annual changes in the CPI have been narrowing. In 1961 the yield on long-term federal government bonds was 5.05 per cent. If the rate of change in 1961 of the Consumer Price Index is subtracted from the yield on federal government bonds, then the "net" yield was 4.15 per cent. In spite of rising yields on federal government bonds, the net yield after subtracting changes in the Consumer Price Index has, until very recently, declined. For example, even though the yield on federal government bonds in 1969 was 7.58 per cent, the net yield after subtracting price changes in that year was 3.08 per cent. In 1970 the net yield on federal government bonds rose to 4.61 per cent.



Much the same pattern is evident with respect to conventional mortgages until very recently when "net" yields increased. In 1961 the conventional mortgage rate was 7 per cent. After subtracting changes in the Consumer Price Index for that year, the "net" yield was 6.0 per cent. Conventional mortgage rates for 1970 averaged 10.45 per cent; the net yield, calculated in the way described above, was 7.15 per cent.

Investor recognition of these past trends has done much to dampen the flow of funds into long-term bonds and mortgages. In recent months, however, the relationship between some interest rates and rates of change in prices has become more favourable.

### Prices, Productivity, and Labour Income

In examining the nature of recent price movements, it should be remembered that prices in our economic system are signals. It is to be expected that where genuine shortages and bottlenecks occur, prices will ration the allocation of resources. Unfortunately, the scarcity aspect as measured by price increases cannot be directly derived from various price indexes. Given this phenomenon, care must be taken to ensure that prices, wages and other incomes continue to reflect real demand situations. For example, if prices and wages are slow to respond to excess capacity and unemployment, then restraining demand will not halt inflation. It will only lead to greater unemployment. Given our present North American economic environment, prices and wages may still rise for some months as a result of past growth while unemployment and excess capacity increase.

Price and wage indexes indicate a general downward inflexibility. This suggests that even if demands in the aggregate are not excessive, increases in price levels will still occur thereby creating a situation wherein relative prices do in fact indicate shortages.

In recent months attention has been focused on the relationship between output per person employed and labour income per employee. It has been suggested that one of the causes of our current inflationary experience has been the fact that labour income per employee has outpaced output per person employed.

Table 9 below shows that in both Canada and the United States output per person employed, using 1961 = 100 as a base, has risen faster than labour income per employee over the period 1961 to the third quarter of

1970. The trend in Canada suggests that the earlier gap between the two indexes has narrowed considerably. The same comparison for the United States indicates that the rate of increase in labour income per employee has not been as great as output per person employed.

**Table 9 – Index of Output per Person Employed and Labour Income per Employee, Canada and United States, 1961-1970 (1961 = 100)**

	Output per Person Employed		Labour Income per Employee	
	Canada	U.S.	Canada	U.S.
1961	100.0	100.0	100.0	100.0
1962	105.4	106.2	103.1	104.0
1963	110.5	110.2	106.8	107.6
1964	116.7	115.3	111.4	112.1
1965	124.0	121.8	118.0	116.0
1966	133.1	130.0	126.8	121.6
1967	138.0	134.9	135.8	126.6
1968	146.8	144.0	144.6	135.0
1969	156.4	151.1	154.2	143.3
1970 <sup>1</sup>	164.0	156.2	162.5	150.8

<sup>1</sup>First three quarters of 1970.

Source: DBS, National Income and Expenditure Accounts, 1926-1968.

DBS, Labour Force Survey.

DBS, Estimates of Employees by Province and Industry.

U.S. Department of Labour, Handbook of Labour Statistics, 1969.

U.S. Department of Labour, Monthly Labour Review.

U.S. Department of Commerce, Survey of Current Business.

### Inflation and Unemployment

The relationship between unemployment and inflation is of prime importance. Much of the discussion regarding policy alternatives and trade-offs has centered around the Phillips curve<sup>2</sup> which purports to show the relationship between hourly earnings, average price rises (or some similar indicator) and unemployment.

Figure 1 on page 10 plots annual implicit price changes on the vertical axis against annual average unemployment rates shown on the horizontal axis for both Ontario and Canada on an annual basis from 1961 to the third quarter of 1970. Two sets of curves for Ontario and Canada have been plotted. The first relates to the period 1961-67, while the

second set, which is above and to the right of the first, relates to the period 1968-1970.

It is significant to note that both sets of curves indicate that the trade-off curve for Canada is to the right and above the curve for Ontario. This suggests that for any given level of price change, the cost in terms of higher unemployment is significantly greater for Canada as a whole than for Ontario. For example, in 1963 for a price change of 1.8 per cent, unemployment was about 3.8 per cent in Ontario and about 5.5 per cent in Canada.

It is not novel to point out the fact that unemployment rates in Ontario have always tended to be markedly lower than those for all of Canada. What is interesting, however, in the present policy context, is that an Ontario Phillips curve shows that much less unemployment has occurred at any given level of price change. Ideally, the data would be more meaningful if some form of implicit price change index were also available for the Ontario economy.

The behaviour of the Phillips curves since 1967 poses some very serious policy problems. While both the curves for Ontario and Canada tended to follow a smooth trade-off relationship between price changes and levels of unemployment up to 1967, from that time forward their performance can best be described as erratic. It appears that both trade-off curves have, in fact, shifted upward and to the right. This is shown by the two shorter curves in Figure 1. This shift has occurred in the region where the implicit price change on an annual basis is equal to or greater than 3.5 per cent. If these relationships persist, the social cost of trade-offs will be excessive. The traditional view that price rises can be tempered by greater unemployment may prove to be unacceptable.

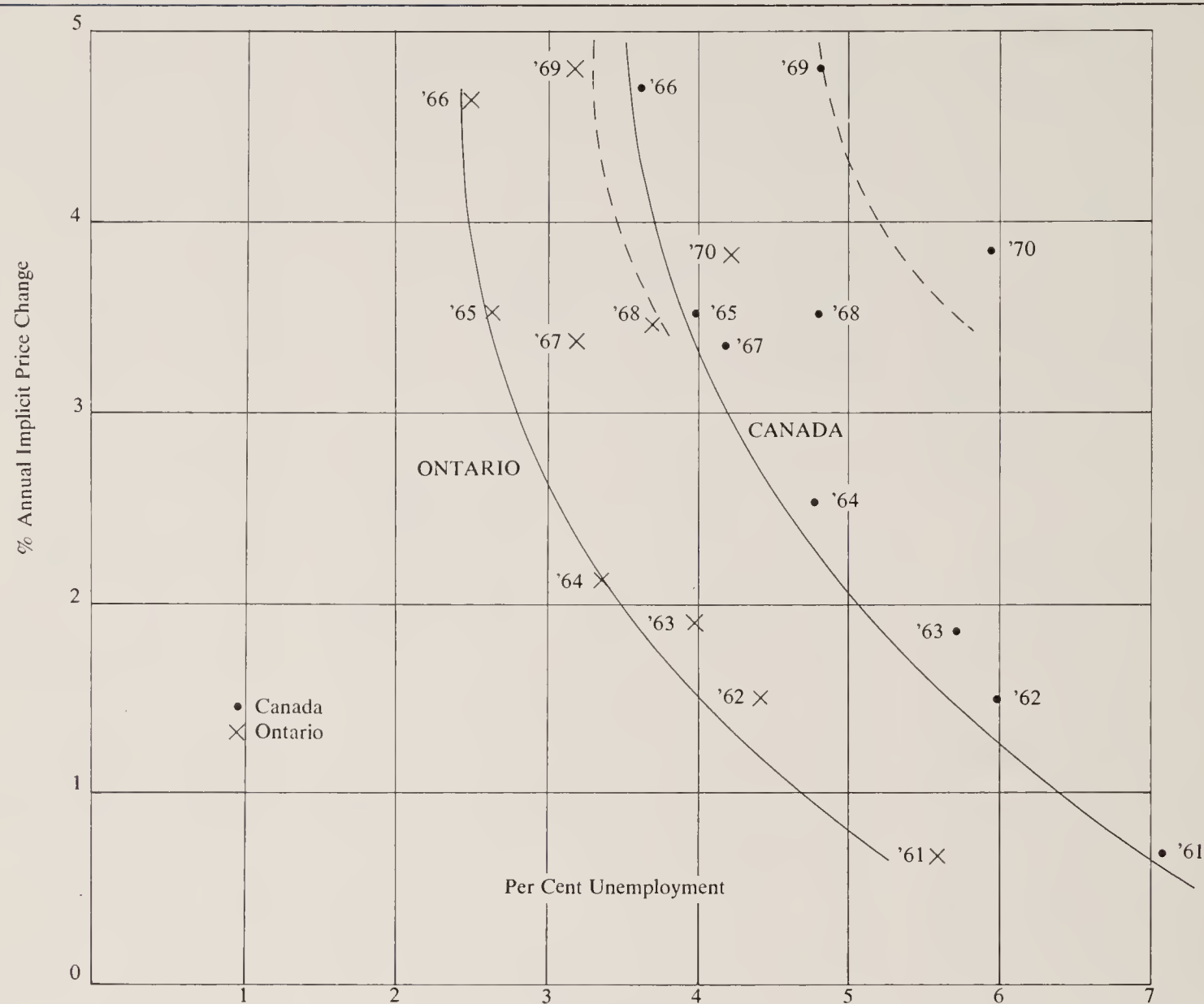
The regional unemployment implications of the Phillips curves are indeed profound. It would appear that the levels of unemployment which slower growing regions of Canada would have to sustain in order to arrive at a moderate increase in the implicit price level would be substantial.

The other policy implication which flows from the Phillips curve is that traditional use of the "big levers" of monetary and fiscal policy may not be appropriate given the behaviour of the Phillips curve during the past few years. The chart suggests that there exist in Canada significant rigidities which impede the movement of resources. These rigidities may affect either capital or labour or both.

<sup>2</sup>Named after A. W. Phillips of the London School of Economics who examined the nature of trade-off relationships.



Figure 1 — Phillips Curve, Ontario and Canada, 1961-1970<sup>1</sup>



<sup>1</sup>First three quarters of 1970.  
Source: DBS, National Income and Expenditure Accounts, 1926-1968.  
DBS, Seasonally Adjusted Labour Force Statistics, 1953-1969.

Table 10 — Unemployment Rates and Annual Changes in the Consumer Price Index, Canada and Regions, 1961-1970

	Canada		Atlantic		Quebec		Ontario		Prairies		British Columbia	
	Unem- ployment	C.P.I.	Unem- ployment	C.P.I.	Unem- ployment	C.P.I.	Unem- ployment	C.P.I.	Unem- ployment	C.P.I.	Unem- ployment	C.P.I.
1961	7.1	—	11.2	—	9.2	—	5.5	—	4.6	—	8.5	—
1962	5.9	1.2	10.7	1.3	7.5	1.2	4.3	0.9	3.9	1.0	6.6	0.3
1963	5.5	1.8	9.5	1.0	7.5	1.7	3.8	1.7	3.7	1.1	6.4	1.6
1964	4.7	1.7	7.8	0.4	6.4	1.6	3.2	1.7	3.1	0.5	5.3	0.7
1965	3.9	2.5	7.4	1.9	5.4	2.1	2.5	2.5	2.5	1.5	4.2	1.9
1966	3.6	3.7	6.4	2.7	4.7	3.0	2.5	4.4	2.1	3.3	4.5	2.4
1967	4.1	3.6	6.6	2.3	5.3	3.9	3.1	3.0	2.3	4.0	5.1	3.7
1968	4.8	4.1	7.3	3.9	6.5	3.4	3.5	3.8	3.0	4.4	5.9	3.7
1969	4.7	4.5	7.5	4.6	6.9	3.1	3.1	4.0	2.9	4.1	5.0	3.4
1970	5.9	3.3	7.4	4.1	7.9	2.1	4.3	2.6	4.3	3.0	7.7	3.4

Note: Price index for region is based on largest city within the region for which data is published.  
Source: DBS, Seasonally Adjusted Labour Force Statistics, 1953-1969.  
DBS, Prices and Price Indexes.



In either event, special policies beyond the traditional monetary and fiscal ones will be required if a better price-unemployment performance is to be achieved.

The average annual rates of regional unemployment and annual changes in the Consumer Price Index for the period 1961 to 1970 are presented in Table 10.

The table documents that the trade-off between reasonable price stability and unemployment has been achieved at a high regional social cost. For example, between 1961 and 1964 when annual increases in the Consumer Price Index were less than 2 per cent, annual unemployment rates in the Atlantic region were 7.8 per cent or higher. During 1961 and 1962 in the Atlantic region the unemployment rates were 11.2 and 10.7 per cent respectively. In Quebec consumer prices were stable from 1961 to 1964 but unemployment rates were significantly higher than Canadian averages. In both the Prairies and British Columbia prices were reasonably stable until 1966. In British Columbia periods of relative price stability were accompanied by high rates of unemployment.

Table 10 illustrates that during 1970 higher unemployment in all regions was accompanied by declines in the rate of increase in the Consumer Price Index.

#### **Factors Affecting Future Price Movements**

In view of the rapidly changing economic environment, the probable course of price movements is very difficult to predict. A number of forces are at work both to restrain future price movements and to accelerate

them. As a result, the outlook for net price movements is somewhat uncertain.

It has been suggested that price movements in the United States tend to be reflected in Canada. This being the case, the success or failure to stem rapidly rising prices in the United States will have a profound influence in Canada. The timing of policies for restraint will be important. Considerable lags are likely to occur before Canadian prices begin to reflect the actions of United States fiscal and monetary authorities.

The rate of price increases in recent months has tended to slow down. Nevertheless, it is still too soon to tell whether the calls for restraint combined with other policy initiatives will bring about reasonable price stability.

Recognition must also be given to two other important domestic factors. Firstly, contract settlements during the past year have been substantial as compared with earlier years. Since many agreements call for wage and other benefit increases in stages over the life of the contract, these cost increases will be reflected for some time to come. Another key variable relates to upcoming contract negotiations. If these contracts should follow the pattern of settlements made during 1969 and 1970 and if, in a number of them, parity with U.S. wage and benefit scales occurs, it is difficult to see how significant price increases can be curtailed during the coming year.

Over the long run, some recognition must also be given to the impact on prices of

pent-up pressures which may be generated by the Prices and Incomes Commission itself. Voluntary restraints may simply blunt immediate price increases while leading to larger increases in the future.

An important factor tempering price growth would be an improvement in productivity. This suggests that policies which discriminate against investments which will add to total output and improve productivity may not be among the best anti-inflationary tools.

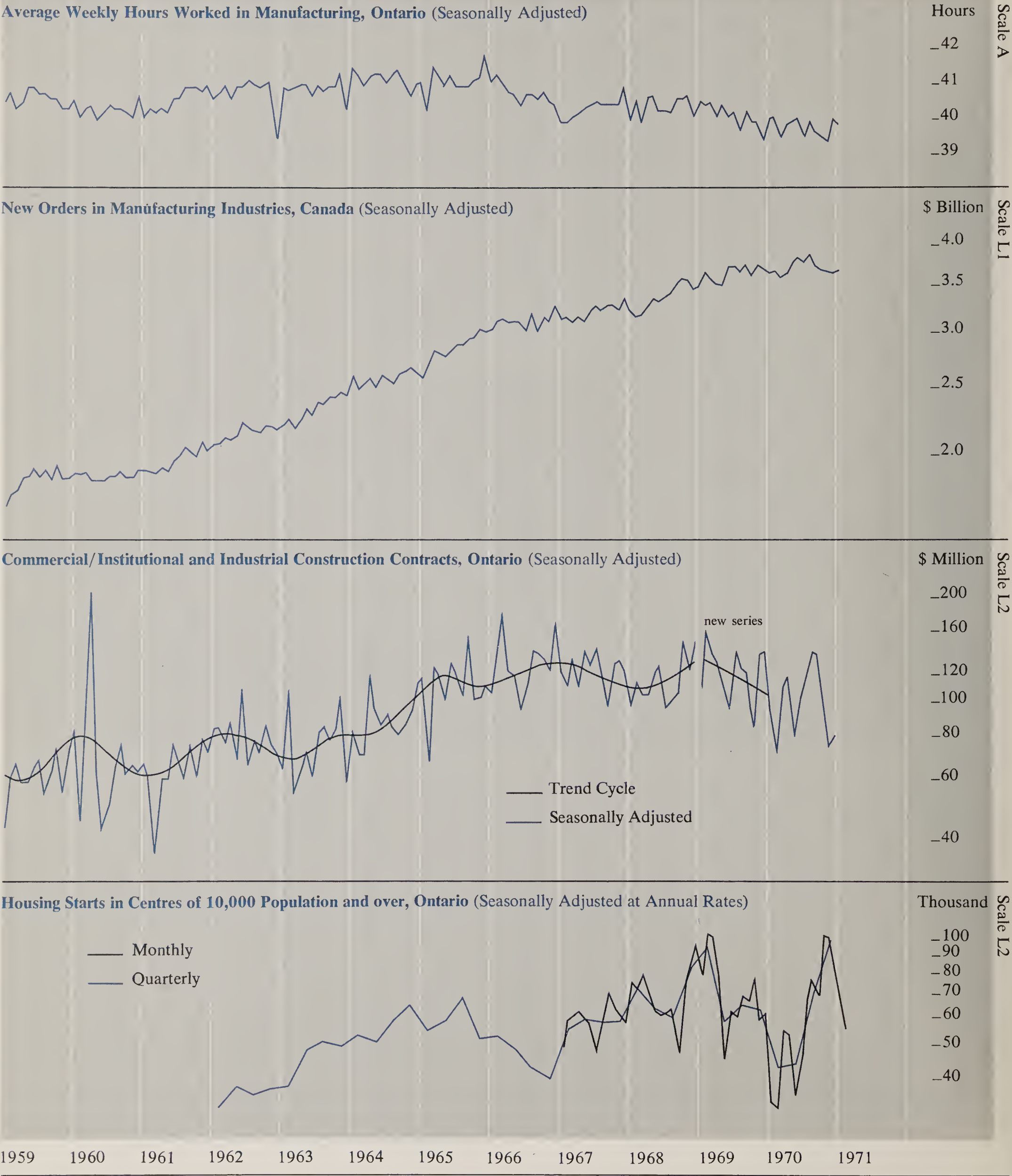
Monetary and fiscal policies may not be overly effective in those areas or parts of the country which in fact have exhibited the slowest economic growth and which continue to experience high rates of unemployment. To some extent there exists a policy paradox. If growth and output are effectively restrained in Ontario, total national output will fall and fewer resources will be available for transfer payments and assistance to areas of slower growth.

While there is a lack of consensus as to the type of inflation Canada is currently experiencing, economists agree that whether it is demand-pull or cost-push or some variant of the two, neither type could have been sustained without large and continuing increases in government expenditures combined with large increases in the money supply. Even without undue increases in the money supply the velocity of money circulation is flexible enough to permit price rises. If such is the case, then pure monetary restraint may not be sufficient to arrest the upward movement of prices.



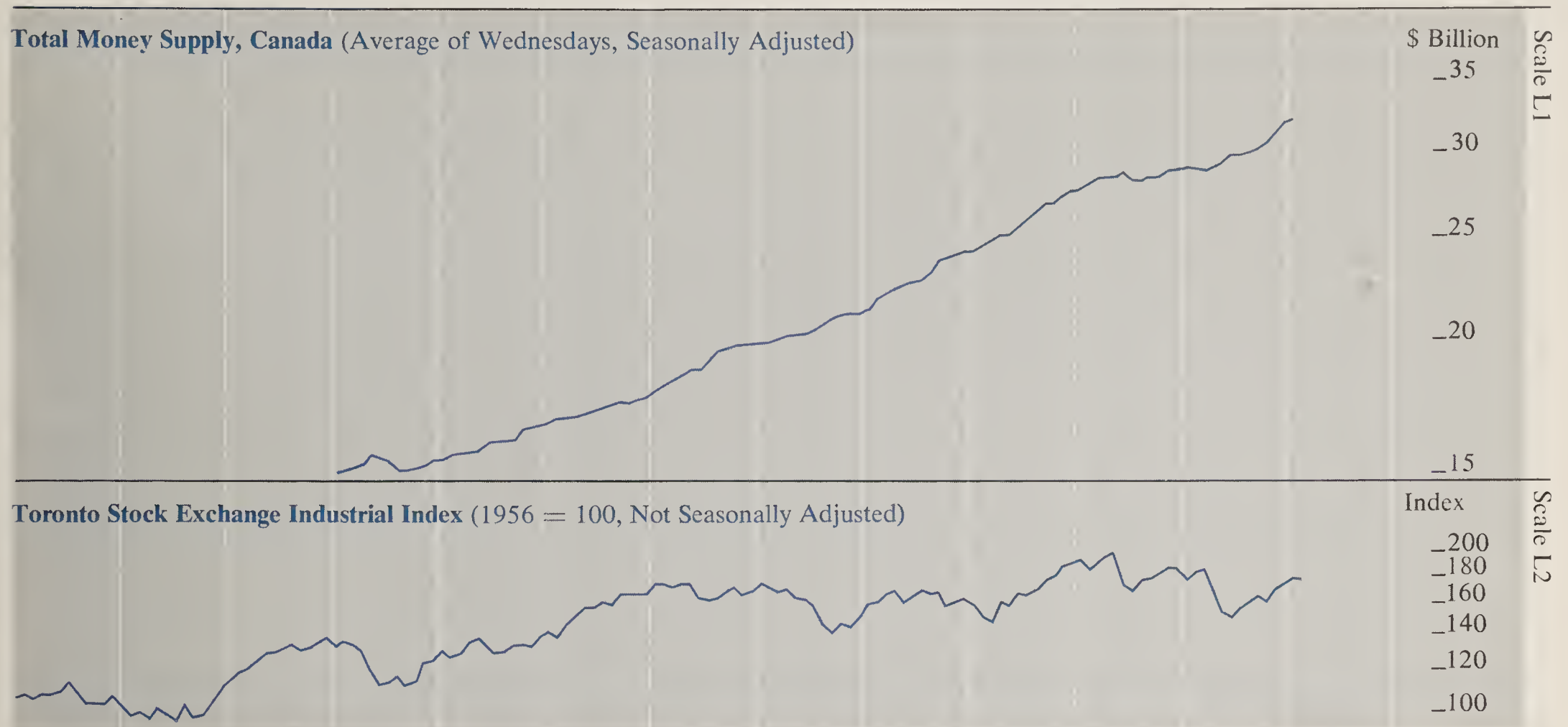
# Selected Economic Indicators

## Leading Indicators

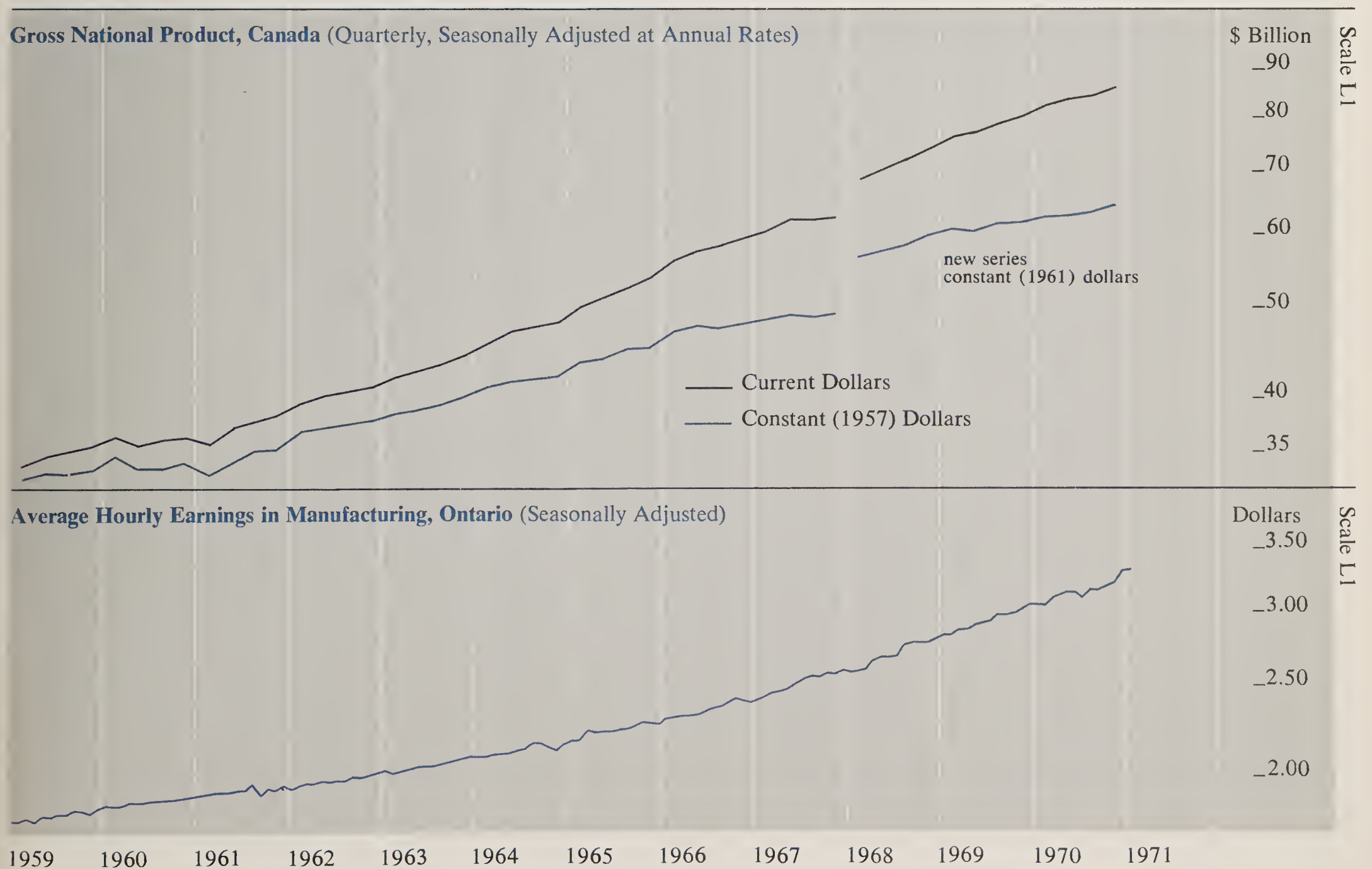




## Leading Indicators

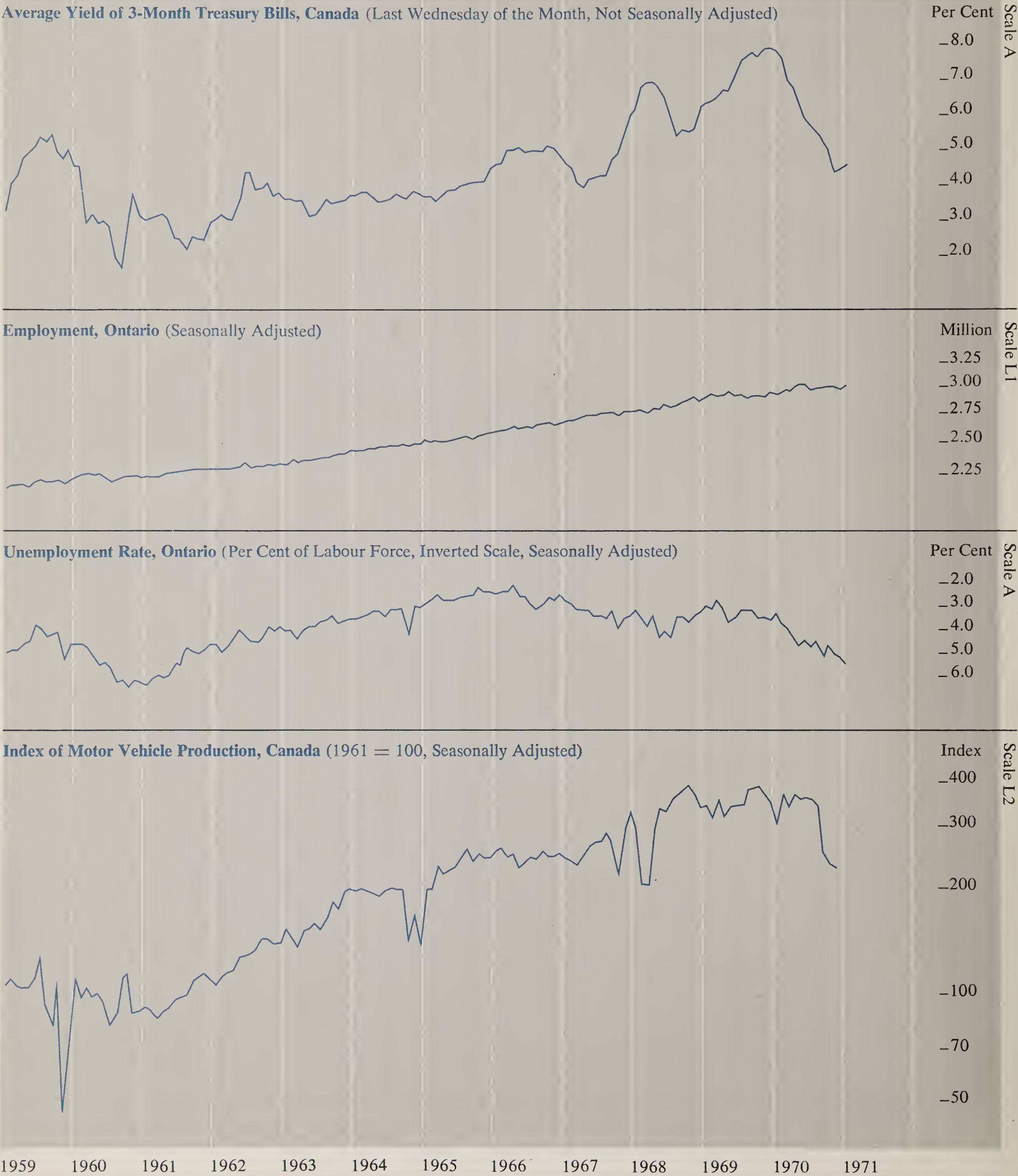


## Coincidental and Lagging Indicators





# Coincidental and Lagging Indicators



HA/747/.0656  
Ontario. Dept. of Economics and  
Ontario economic review



Seasonally Adjusted

1970														1971	
	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	
Leading Indicators															
Average Weekly Hours Worked in Manufacturing	40.0	40.1	39.5	39.8	39.9	40.6	39.5	40.0	39.6	39.5	39.4	40.1	39.8		
New Orders in Manufacturing Industries <sup>c</sup>	3,810	3,810	3,682	3,795	3,771	3,852	3,804	3,883	3,754	3,697	3,689	3,686	3,899		
Commercial/Institutional and Industrial Construction Contracts	94.8	75.0	112.1	119.7	82.0	103.0	122.9	142.1	138.5	109.6	75.7	82.9			
Urban Housing Starts (Annual Rate)	34,800	33,600	55,700	53,900	37,200	45,200	67,500	77,500	69,200	106,000	103,800	82,300	60,600	55,600	
Money Supply <sup>c</sup>	28,955	28,947	28,817	28,966	29,224	29,668	29,769	29,996	30,132	30,549	31,259	31,826	32,289		
T.S.E. Industrial Index <sup>u</sup>	177.89	183.92	185.17	171.08	154.21	151.53	157.36	160.28	165.8	162.1	168.7	174.4	178.1	177.4	
Business Failures <sup>u</sup>	56	71	82	54	65	77	73	48	55	71	74	71	71		
Business Failures — Liabilities <sup>u</sup>	9.9	18.7	4.0	2.2	3.4	8.1	3.1	2.8	5.3	8.1	5.8	7.7	11.6		
Coincidental and Lagging Indicators															
Gross National Product <sup>c</sup> (Annual Rate)			82,684			83,824			84,988					86,376	
Average Hourly Earnings in Manufacturing	30.9	3.13	3.13	3.13	3.17	3.21	3.22	3.22	3.18	3.21	3.22	3.33	3.34		
3-Month Treasury Bill Rate <sup>c,u</sup>	7.78	7.60	7.00	6.78	6.34	5.94	5.70	5.51	5.39	5.01	4.40	4.44	4.68		
Cheques Cashed in Clearing Centres <sup>1</sup>	6,078	6,099	6,661	6,487	6,313	6,386	6,358	6,774	7,184	7,007	6,464	6,446			
Retail Trade	894	883	897	911	912	898	918	909	917	897	904	916	900		
Labour Force	3,058	3,073	3,099	3,111	3,174	3,162	3,121	3,129	3,145	3,166	3,167	3,151	3,215	3,223	
Employed	2,953	2,962	2,977	2,978	3,035	3,025	2,976	2,996	3,003	3,030	3,020	2,996	3,042	3,054	
Unemployed	106	111	115	130	137	134	142	142	158	147	156	162	173	169	
Unemployed as % of Labour Force	3.5	3.6	3.7	4.2	4.3	4.2	4.5	4.5	5.0	4.6	4.9	5.1	5.4	5.2	
Wages and Salaries	1,529	1,549	1,550	1,547	1,571	1,586	1,584	1,601	1,596	1,600	1,610	1,616			
Index of Industrial Employment	132.1	133.0	132.7	132.1	131.7	131.4	131.1	131.7	130.2	130.0	129.7	132.0	132.1		
Index of Industrial Production <sup>c</sup>	171.1	174.4	171.5	172.4	170.5	170.2	170.0	171.0	169.1	168.6	171.1	170.6	171.4	172.4	
Total Manufacturing <sup>c</sup>	167.8	171.0	168.1	170.0	167.5	167.4	165.4	166.5	163.1	164.3	165.5	165.2	167.1	168.5	
Non-Durables <sup>c</sup>	152.3	154.3	152.8	154.8	155.0	152.4	152.8	151.8	152.2	152.0	155.3	152.9	152.7	150.6	
Durables <sup>c</sup>	186.8	191.4	186.7	188.6	182.8	185.8	181.7	184.4	176.4	179.9	178.4	180.8	185.3	191.2	
Mining <sup>c</sup>	170.2	175.7	170.6	164.2	166.6	170.8	173.4	174.6	178.2	175.4	186.7	180.9	175.6	176.1	
Electric Power and Gas Utilities <sup>c</sup>	201.0	203.0	203.0	206.4	203.7	205.1	206.1	205.9	208.4	195.0	194.8	200.9	201.4	199.5	
Primary Energy Demand (Annual Rate)	64.53	63.91	62.94	63.39	61.60	63.35	65.03	65.68	66.80	65.56	64.32	66.79	67.62	67.76	
Exports (including re-exports) <sup>c</sup>	1,447.0	1,402.1	1,410.1	1,439.0	1,434.1	1,392.2	1,422.7	1,321.1	1,391.3	1,416.0	1,479.8	1,312.0	1,440.0	1,389.0	
Imports <sup>c</sup>	1,116.8	1,230.6	1,242.6	1,191.6	1,207.1	1,182.5	1,187.5	1,162.3	1,184.5	1,006.0	1,138.0	1,020.0	1,128.0	1,153.0	
Unclassified Indicators															
Foreign Exchange Reserves <sup>c,u</sup>	2,698	2,777	2,936	3,179	3,406	3,650	3,689	3,848	3,785	3,831	3,871	3,813	3,816		
Industrial Materials Price Index <sup>c,u</sup>	272.3	272.3	275.7	274.4	273.7	271.5	270.3	268.5	269.2	267.4	266.4	264.2	264.2		
Consumer Price Index <sup>c,u</sup>	128.2	128.7	128.9	129.7	129.6	129.9	130.5	130.5	130.2	130.3	130.3	129.8	130.3	130.9	

<sup>c</sup>Statistics for Canada.

<sup>u</sup>Not seasonally adjusted.

<sup>1</sup>Ontario less Toronto.









# Ontario Economic Review

REFERENCE COPY 1971

Special Supplement  
March 1971

Department of Treasury and Economics

Hon. W. Darcy McKeough, Treasurer of Ontario  
and Minister of Economics

H. Ian Macdonald, Deputy Minister



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**A publication of the Department of Treasury and Economics  
Government of Ontario**

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*Treasurer of Ontario and Minister of Economics*  
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*Deputy Minister*

The *Ontario Economic Review* is prepared and edited bimonthly in the Economic Analysis Branch of the Economic and Statistical Services Division, Department of Treasury and Economics. The review presents articles of interest as well as current information on economic activity in Ontario. Signed articles reflect the opinions of their authors and do not necessarily represent the views of the Department.

Subscriptions can be obtained free of charge by writing the Editor,  
*Ontario Economic Review*, Department of Treasury and Economics,  
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# An Econometric Model for the Ontario Economy<sup>1</sup>

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In recent years the increasing complexity of advanced industrial economies has necessitated the use of sophisticated analytical techniques such as econometric models and input-output tables in order to meet the growing need for detailed quantitative analysis. Although several statistical models are now available for the Canadian economy, few attempts have been made at the provincial level largely due to lack of adequate statistical information.

Despite the existing data limitations the Economic Analysis Branch of the Department of Treasury and Economics initiated in 1968, a continuing econometric research program to provide an integrated system of analytical tools for medium and long-term forecasting and the evaluation of alternative economic policies. Within the context of this program three major projects have been completed during the past two years. The first of these projects involved the construction of an input-output table which portrays the structural framework of Ontario's economy in terms of interindustry flows of goods and services, while the second concentrated on the development of a comprehensive set of Provincial Economic Accounts which provide the necessary data base for the formulation of an econometric model for the Province.

The present study describes in detail the recently completed version of the Ontario Econometric Model. The first part of the report outlines the basic concepts and methodology of econometric model building. Part II reviews six econometric models designed for regional economies in the United States and Canada during the last fifteen years. Part III deals with the specification of the Ontario model and outlines the methodology adopted in designing the model and its major characteristics. The final chapter presents the parameter estimates and evaluates the statistical and predictive properties of the equation system.

## I THEORETICAL ASPECTS OF ECONOMETRIC MODEL BUILDING

### 1.1 Research Methodology in Economics

Economists are essentially concerned with understanding the functioning of economic systems by studying the relationships of observable and measurable variables in such systems. An important characteristic which distinguishes economics from natural sciences relates to the method of research used in analysing functional relationships. In natural sciences research methodology is relatively

simple, since it is possible to subject the system under study to laboratory control, and to isolate and analyse the movements of one variable at a time keeping all other variables constant. In economics, on the other hand, the laboratory method is not feasible, because it is impossible to exercise experimental control on economic variables. As a result, economic measurements take place under the full complexity of the system resulting from the simultaneous interaction of a large number of economic, as well as social, political and other factors. Economists, therefore, must resort to other methods of simplifying the system.

### 1.2 Economic Investigations

The problem of any quantitative economic analysis is, essentially, to explain why economic variables, such as consumption, investment, exports, etc., assume certain values over a time span. The basic question is whether there are any laws of economic dynamics which determine what values these variables take at different points in time. If such laws exist we must ask further whether they can be estimated in order to gain knowledge of the structure of economic systems and attempt to improve their performance.

### 1.3 Approaches to Economic Problems

These economic problems may be attacked in various ways depending on the attitude of the particular investigator. In the real world we meet three types of investigators, namely, the naive investigator, the sophisticated investigator and the economic theorist.

The naive investigator postulates that there are no laws of economic dynamics and that economic events are influenced by a myriad of factors which cannot be controlled or predicted. Consequently, the formulation and implementation of economic policies, which attempt to alter the course of economic events, is a fruitless exercise. Needless to say this negative approach is sterile since it implies that the economic system should be left to operate on its own with no extraneous intervention. The Great Depression has taught economists and politicians that it is imperative to influence the operation of the system in order to avoid or minimize the effects of economic disasters.

The sophisticated investigator admits that a system exists but he goes on to argue that it is, in fact, so complex that no feasible model of the system can be explicitly formulated. Let us consider, for example, the demand for a single commodity by a household

during a certain period of time. This demand is a function of a large number of variables, i.e., the price of the commodity in question, the prices of other commodities, the income of the household, the availability of credit and liquid assets, the number of persons in the household, their past consumption habits, their age and educational background etc. And since each household demands several hundreds of different commodities we need an equal number of demand functions to explain its consumption patterns. Moreover, there are several thousands of households in the economic system and, hence, a myriad of functions are required to explain merely the consumption of commodities. The same is true for the production of commodities, the behaviour of investors, governments etc. Following this line of thought, the sophisticated analyst advocates that the magnitude of the research effort lies beyond the available resources. Accordingly, he attempts to assess the situation using his intuition and personal judgement which constitute the basis of his advice on matters of economic policy. The problem is, of course, that "there are about as many types of advice as there are advisors (sometimes even more!)"<sup>1</sup>.

The economic theorist attempts to simplify the economic system by building a theory or model which approximates the real world. The crucial elements of a theory are the assumptions made, the logical process followed and the results. By manipulating his model the economic theorist arrives at policy measures best suited to deal with specific economic problems. There are two difficulties associated with this approach which make its use problematical. First, one finds in economic literature several theoretical models which attempt to explain the same economic phenomena. The question is which model reflects the real world. Secondly, theoretical models are usually deterministic, i.e., the functional relationships are specified in an exact mathematical form without incorporating stochastic components. However, exact relationships are not normally observed in practice and, therefore, deterministic models are not suitable for empirical work because they fail to account for the fact that there is a stochastic and unpredictable element in human behaviour.

### 1.4 The Role of Econometrics

It is evident from the above discussion that we need tools of analysis which would yield objective economic policies, independent of

<sup>1</sup>See L. R. Klein, "The Use of Econometric Models as a Guide to Economic Policy", *Econometrica* (April, 1947) p. 111.



the personal judgement or theory of a particular investigator. "Econometric models are put forth in this scientific spirit, because these models, if fully developed and properly used, eventually should lead all investigators to the same conclusions, independent of their personal whims"<sup>2</sup>.

The role of econometrics is essentially to fill the gap between economic theory and applications, and may be regarded as the natural science approach to economics. Econometric research can provide important information in three major fields of enquiry, namely, in testing economic theories, in forecasting and in policy simulations.

Using econometric methods it is possible to subject different economic theories to empirical test, and thus retain only the theories that are consistent with the facts and reject those which are inconsistent with reality.

Econometric analysis is also a powerful tool for making economic forecasts. There are two considerations however that we must bear in mind when we use this tool of analysis for forecasting. First, it must be realized that econometric models are not magic formulas<sup>3</sup> which unravel the complexity of economic systems in a few equations. Such models can predict the future outcome of economic events, on the basis of historical records, given that households, businessmen and governments continue to behave in the future as they did in the past. Any change in behaviour patterns is reflected in the structure of the system and necessitates the modification of one or more equations in the model before it can be used to make forecasts.

Secondly, econometric forecasts can be expressed as point (single value) forecasts or as interval forecasts. Point forecasts are of the form: if you change variable  $X$  by  $\Delta X$  the effect on variable  $Y$  will be  $\Delta Y$ . Such forecasts may not be realized even when the statistical relationships of the model remain stable and continue to hold in the forecasting period. This is because, unlike the models of economic theorists, econometric models are probabilistic, i.e., each statistical relationship contains a stochastic error term to account for errors of observation or measurement as well as for factors that are not quantifiable. The inclusion of the error term in econometric functions may produce a discrepancy between a single value forecast of an economic variable and its realized value. This, however, reflects the nature of

economic life and is not a defect of econometric models.

Interval forecasts, on the other hand, are of the form: if you change variable  $X$  by  $\Delta X$  the expected effect on variable  $Y$  will be  $\Delta Y$  but the actual effect will lie in the range  $\Delta Y - e$  to  $\Delta Y + e$  with a specified probability level, say, 99 per cent of the time. Such forecasts are of greater importance because they provide an explicit measure of the probabilistic element in economic systems. It is unfortunate that most economists engage themselves in making precise point forecasts. Some of these forecasts subsequently fail to hit the mark and this has raised questions as to the usefulness of econometric models. Hopefully economists will realize the importance of interval forecasts and attempt to produce these more frequently.

Finally, econometric models can be used in simulating policies. It is possible to simulate alternative economic policies and study their implications on the economic system before such policies are actually put into effect. This type of information is extremely useful to policy makers and planners.

### 1.5 Essential Stages of Econometric Model Building

The construction of an econometric model involves the following stages:

- a) The specification of the model
- b) The identification of the stochastic equations in the model
- c) The assembly of relevant statistical information
- d) The estimation of the model
- e) The analysis and testing of the model.

The specification stage, which constitutes the initial step in designing a model, is the mathematical formulation of economic theory in terms of a number of stochastic equations. Each equation contains one dependent variable on the left-hand side and two or more explanatory variables on the right-hand side (including a stochastic variable). At this stage, the designer of the model is faced with four major questions:

i) What variables should be used in the equations? Variables which are difficult to measure are not normally used unless they are essential to the model. It is not possible, of course, to use variables which are not quantifiable or variables on which data do not exist. In a forecasting model the relevant variables must be available. If current values are not available, lagged variables may be used. In policy simulation, the policy vari-

ables introduced into the model must be those over which the government has control.

ii) What form of relation should be specified, i.e., linear, log etc.? Linear relationships are simple to estimate and manipulate. The disadvantage of using linear relation is that they may not fit the data very well, resulting in large forecasting errors.

iii) Should original series or first differences be used. In short-term forecasting it may be more appropriate to analyse an economic system in terms of year-to-year changes, i.e., rates of change of variables instead of levels.

iv) What form of lag structure should be specified.

The third stage<sup>4</sup> in the construction of a model involves the collection of data pertaining to the variables chosen in stage one. The model builder must decide on two important issues:

i) What length of time period should be employed. The number of observations determines the range of experience. In general, the number of years must be sufficiently large to provide enough experience. On the other hand, if a very long period is considered, the model may produce estimated parameters which are subject to change with time.

ii) What length of time unit should be used. If years are used as units of time, the model may not be realistic. An inventory model, for example, based on annual data would not represent the real world if manufacturers adjust their production and stocks quarterly. If quarters are used as time units the lag structure becomes more complicated, moreover quarterly data may not be available, and if such data do exist they must be seasonally adjusted.

The estimation stage consists of fitting the model to the data, collected in stage three, by appropriate statistical techniques to obtain numerical estimates of the parameters. The last stage requires that the model be tested and analysed before it is put into operation.

### 1.6 Classification of Economic Variables

The economic variables appearing in the statistical relationships of a simultaneous-equation system are conventionally classified as:

- a) Current endogenous variables
- b) Predetermined variables
  - (i) lagged endogenous variables
  - (ii) exogenous variables.

The current endogenous variables generated within the economic system, their

<sup>2</sup>*ibid.*

<sup>3</sup>See Jack Johnston, "Econometrics: Science or Witchcraft?", *The Manchester Guardian*, August 17, 1965.

<sup>4</sup>The identification problem is discussed in Section 3.20.



values being determined by the simultaneous interaction of the relations in the system. Examples of such variables are; personal consumption expenditures, business investment, imports, exports etc. Each equation in the system explains one current endogenous variable, which appears on the left-hand side, in terms of other current endogenous and/or predetermined variables appearing on the right-hand side. The current endogenous variables are thus, interdependent and equal to the number of relationships (equations) specified in the model. This condition of equality between the number of current endogenous variables and equations is necessary in order to obtain a unique solution of the system.

The predetermined variables are generated outside the economic system and their values are determined by non-economic factors.

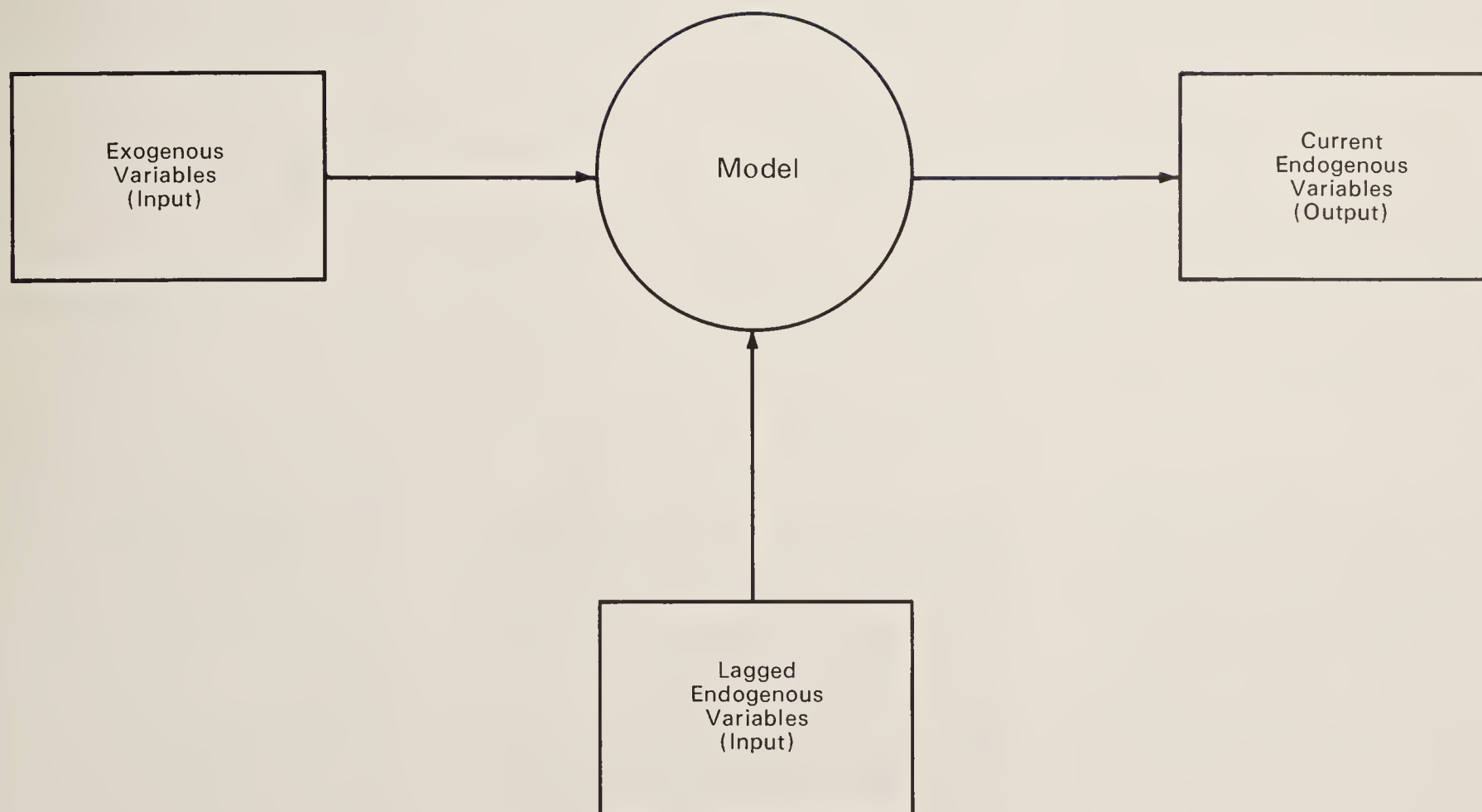
They consist of lagged endogenous variables, such as past levels of income, consumption etc., which affect the system with a delay of one or more time periods, and exogenous variables, such as climate, government decisions etc., which are extraneous to the system. The predetermined variables exert a unidirectional influence on the economic system, in the sense that they affect the outcome of the current endogenous variables without being affected by them. Consequently, there are no equations in the system explaining predetermined variables.

The classification of variables into endogenous and exogenous is a relative one, depending on the particular model at hand, especially its size and the purpose for which it was constructed. Some of the variables denoting, for instance, per capita income, the rate of unemployment etc., are called "target

variables". Other variables representing monetary aspects of the system or government spending are sometimes referred to as "policy variables". A target variable normally represents a welfare index, whereas a policy variable is an instrument in the hands of policy makers and planners. Economic policy, then, may be thought of as the coordinate of actions directed towards changing and manipulating the policy variables in order to produce desirable effects on the target variables.

Using the concepts of endogenous and predetermined variables we can represent the operation of an econometric model in a schematic form as shown in Diagram 1-1. In each time period, values of the lagged endogenous and exogenous variables are fed into the model as input, and values for the current endogenous variables are generated as output.

**Diagram 1-1. Operation of an Econometric Model**





### 1.7 Classification of Econometric Models

This Section attempts a classification of econometric models to facilitate the discussion in later chapters. We may distinguish four broad groups of models depending on:

- The purpose for which they are constructed
- The data used in their estimation
- The area to which they relate
- The way in which they are designed.

Each of these major groups can be further

sub-divided into a number of sub-groups. Thus, using the purpose as a guideline, we distinguish theory-testing, forecasting and policy models. Forecasting models, in turn, may be classified as short-term and long-term models.

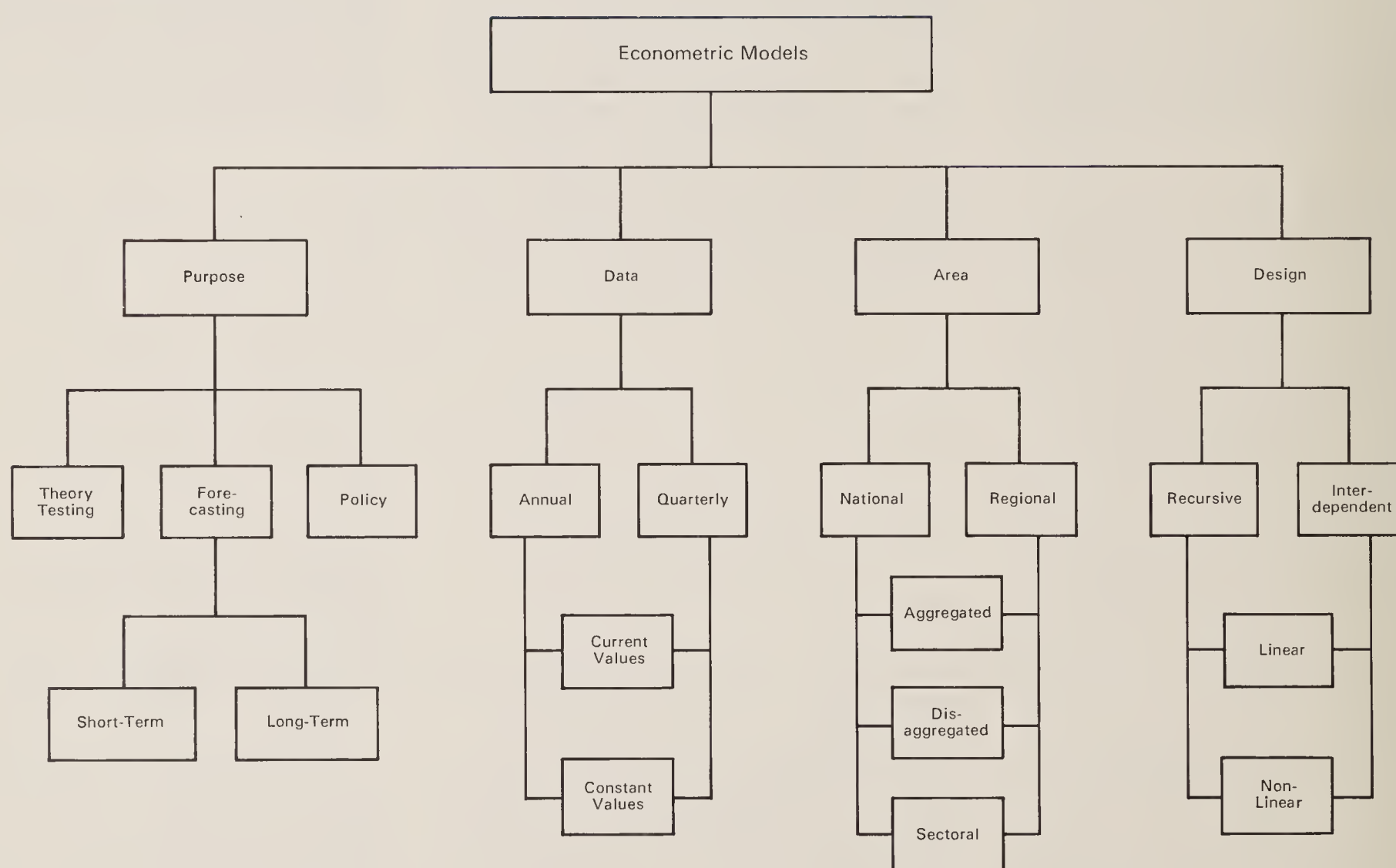
The data criterion produces two major sub-groups, namely, annual versus quarterly models, depending on whether they utilize annual or quarterly data. Such data may be either in current or constant dollars or a

mixture of both.

The area group can be broken down into national and sub-national (regional) models which can be of varied degrees of aggregation, and may relate to the entire economy (macro-models) or to some sectors of the economy (micro-models).

Finally, the design criterion yields recursive versus interdependent models, either linear or non-linear (i.e., linear in parameters but not necessarily linear in variables).

Diagram 1-2. Classification of Econometric Models



This classification is illustrated in Diagram 1-2. A particular model, of course, may combine several of the above features, eg., it may be an aggregate national short-term forecasting interdependent model, estimated on the basis of quarterly series expressed in constant dollars. Two pairs of models, namely, national vs regional and recursive vs interdependent are very significant for the Ontario model and deserve special attention.

### 1.8 National vs Provincial or State Models

Econometric models of the national economy

have two important advantages over provincial or state models. The first relates to the quality and quantity of data available for their estimation. National models employ national statistical series which are available on a quarterly basis in current as well as in constant dollars. On the other hand, provincial models utilize provincial data, normally derived from a decomposition of national statistics. Due to the estimation problems involved in decomposing national data, the provincial series can at best be estimated on an annual basis at current prices. Conse-

quently, in designing a provincial model one is faced with various data constraints which are not encountered at the national level.

The lack of quarterly data at the provincial level is a serious problem for two reasons. First, it excludes the possibility of formulating a quarterly model, which may be a better approximation of the provincial economic system. Secondly, it restricts the range of experience for a specified time period. If we wish, for example, to study the performance of the Ontario economy in the period 1957-68, quarterly data will provide



48 observations whereas annual data will yield only 12 observations. Similarly, the lack of price deflators at the provincial level makes it impossible to convert data from current to constant dollars. This difficulty poses a constraint on the specification of a provincial model, in the sense that certain important relationships cannot be included in it. A production function, for example, specified in terms of current variables can be of limited use in assessing the effects of growth of output on employment, because it is growth in real terms and not inflation that stimulates employment.

The second advantage of national models in relation to provincial is that they can incorporate a wider choice of policy variables. National models normally contain relationships which explain policy variables directly controlled by the federal government, i.e., variables denoting the money supply, interest rates, mortgage yields, unemployment insurance payments, federal taxes, import duties etc. These variables exert a direct effect on the provincial economy and should, ideally, be included in a provincial model as endogenous. However, provincial authorities have no direct control over variables which fall within federal jurisdiction. Consequently, in provincial models such variables are treated as exogenous. This is one of the reasons why sub-national models lack a monetary sector.

Although the above limitations of provincial and state models are undesirable they do not diminish the importance and usefulness of these models in analysing this type of economy.

### 1.9 Recursive vs Interdependent Models

The concepts of recursiveness and interdependency in econometric models are closely associated with the notion of causality<sup>5</sup> in the sense of a stimulus-response relationship among variables. Interdependent models contain variables which are mutually interdependent, i.e., if  $X$  and  $Y$  denote two variables then  $X \rightarrow Y$  and  $Y \rightarrow X$ , where the arrows indicate the direction of causation. In recursive models, on the other hand, the variables are not mutually interdependent, i.e., the causation is unidirectional so that  $X \rightarrow Y$  but not  $Y \rightarrow X$  or vice versa.

The formal properties of a recursive model best be illustrated with the use of a simple example. Consider a highly aggregated linear model consisting of a consump-

tion function, an investment function, and the familiar national income identity.

$$C_t = \gamma_{11} Y_{t-1} + u_{1t} \quad (1-1)$$

$$I_t = \beta_{21} C_t - \gamma_{21} C_{t-1} + u_{2t} \quad (1-2)$$

$$Y_t = C_t + I_t + G_t \quad (1-3)$$

where  $C$  denotes consumption,  $Y$  income,  $I$  private investment,  $G$  government expenditure, and  $u_{1t}$ ,  $u_{2t}$  are random disturbances. All variables are dated by using the subscript  $t$  which refers to time. Government expenditure,  $G_t$ , is considered to be the only exogenous variable in the model and hence we have three current endogenous, and three predetermined variables (two lagged endogenous and one exogenous).

We now attempt an ordering of equations and variables in the following fashion:

$$\begin{array}{rcl} C_t & - \gamma_{11} Y_{t-1} & = u_{1t} \\ - \beta_{21} C_t + I_t & + \gamma_{21} C_{t-1} & = u_{2t} \\ - C_t - I_t + Y_t & - G_t & = 0 \end{array}$$

We can write these equations in matrix form as

$$\begin{bmatrix} 1 & 0 & 0 \\ -\beta_{21} & 1 & 0 \\ -1 & -1 & 1 \end{bmatrix} \begin{bmatrix} C_t \\ I_t \\ Y_t \end{bmatrix} + \begin{bmatrix} -\gamma_{11} & 0 & 0 \\ 0 & \gamma_{21} & 0 \\ 0 & 0 & -1 \end{bmatrix} \begin{bmatrix} Y_{t-1} \\ C_{t-1} \\ G_t \end{bmatrix} = \begin{bmatrix} u_{1t} \\ u_{2t} \\ 0 \end{bmatrix}$$

or

$$BY_t + \Gamma X_t = u_t \quad (1-4)$$

where  $B$  is a  $(3 \times 3)$  matrix of coefficients of current endogenous variables

$Y_t$  is a  $(3 \times 1)$  vector of current endogenous variables

$\Gamma$  is a  $(3 \times 3)$  matrix of coefficients of predetermined variables

$X_t$  is a  $(3 \times 1)$  vector of predetermined variables

$u_t$  is a column vector of disturbances.

The  $B$  matrix is always a square matrix because of the equality between structural equations and current endogenous variables, whereas the  $\Gamma$  matrix need not necessarily be square. Thus, in models containing  $i$  equations in  $i$  endogenous variables the  $B$  matrix is of order  $(i \times i)$  and can be defined as

$$B = \beta_{ij}$$

A model then, such as (1-4), is said to be recursive if the following two conditions are satisfied:

a) The  $B$  matrix is triangular, that is,

$$\beta_{ij} = 0 \text{ for all } j > i \quad (1-5)$$

b) The variance-covariance matrix of disturbances is diagonal, that is,

$$E(u_{it} u_{jt}) = 0 \text{ for all } j \neq i \quad (1-6)$$

Condition (1-6) is referred to as the assumption of serial independence of the disturbance

terms. Whether this condition holds can only be detected at the estimation stage of a model. It is customary, however, at the specification stage before a model has been estimated, to use condition (1-5) as a criterion of recursiveness or non-recursiveness. This is legitimate so long as one remembers that this formal condition is necessary but not sufficient. Using condition (1-5) we can state that our simple model consisting of equations (1-1), (1-2) and (1-3) is recursive since the  $B$  matrix is triangular.

Consider next the case where equation (1-1) is replaced by

$$C_t = \beta_{11} Y_t + u_{1t} \quad (1-7)$$

The resulting model of equations (1-7), (1-2) and (1-3) is non-recursive or interdependent, since it is no longer possible to arrange the equations so as to obtain a triangular  $B$  matrix. This matrix is now

$$B = \begin{bmatrix} 1 & 0 & -\beta_{11} \\ -\beta_{21} & 1 & 0 \\ -1 & -1 & 1 \end{bmatrix}$$

which, of course, is not triangular.

There is much controversy in econometric literature over these two types of models. The Klein school of thought argues in favour of the interdependent models, while the Wold school leans toward the recursive models. There are no criteria for deciding, *a priori*, on the type of model to be used on specific occasions. Recursive models have the advantage that they can be estimated by Ord-

<sup>5</sup>See H. A. Simon, "Causal Ordering and Identifiability", Studies in Econometric Method. Eds. W. C. Hood and T. C. Koopmans, Cowles Commission Monograph 14, New York: Wiley and Sons, 1953, pp. 49-74.



nary Least-Squares, which is not true for interdependent models. On the other hand, interdependent models are more flexible in their specification since they do not demand that the B matrix be triangular. The final choice between these types of models depends primarily on the availability of data.

## II ECONOMETRIC MODELS OF STATES AND PROVINCES: A SURVEY

### 2.1 Regional Econometric Models

The previous chapter outlined the basic concepts and methodology of econometric model building. This chapter examines six sub-national models for the States of Massachusetts, Ohio, Georgia, Michigan and the Provinces of Nova Scotia and Prince Edward Island. These models can be used as a guideline for evaluating the Ontario model presented later.

### 2.2 The Econometric Model of the State of Massachusetts

The Massachusetts model was constructed by Frederick W. Bell<sup>1</sup>, Regional Economist at the Federal Reserve Bank of Boston. It is essentially a Keynesian model designed to forecast the long-term demand and supply of labour in the Massachusetts region. The model consists of eight stochastic equations and six definitional identities, thus explaining fourteen regional economic variables in terms of regional predetermined variables, with the exception of one national variable denoting GNP. It contains one export function, one consumption function, two investment functions, and three equations explaining labour supply, migration and wages.

The model was fitted to annual data for the period 1947-62 expressed in constant dollars. The estimated equations are shown here, where the numbers in parentheses beneath the coefficients are their standard errors.  $R^2$  is the unadjusted coefficient of multiple determination and DW denotes the Durbin-Watson d statistic.

The author claims that his model is essentially recursive<sup>2</sup>. However, one can detect a two-way causation between the variables  $S_t$  and  $(V_1)_t$  in equations (2-2) and (2-12). To overcome this difficulty, Bell estimated the parameters of equation (2-2) by Indirect Least-Squares (ILS), i.e., by applying Ordinary Least Squares (OLS) to the reduced form of the income determination block of

#### Stochastic Equations

$$X_t = 430.55 + 6.71 \text{ GNP}_t \quad (2-1)$$

(103.86) (0.329)

$$R^2 = 0.967 \quad DW = 1.114$$

$$S_t = -135.1 + 0.7297 (V_1)_t \quad (2-2)$$

$$\log (k_m)_t - \log (k_m)_{t-1} = 0.5113 + 0.939 \log X_t - 1.023 \log K_{t-1} - 0.0062 t \quad (2-3)$$

(1.007) (0.289) (0.211) (0.0032)

$$R^2 = 0.712 \quad DW = 1.447$$

$$\log (k_{nm})_t = 0.8389 + 0.798 \log S_t \quad (2-4)$$

(0.2265) (0.096)

$$R^2 = 0.927 \quad DW = 1.251$$

$$(V_2)_t = 6422 K^{0.29} L^{0.71} (1.013)^t \quad (2-5)$$

(0.00128)

$$R^2 = 0.908 \quad DW = 1.580$$

$$(Ne)_t = 0.4009 (Pe)_t \quad (2-6)$$

(0.00027)

$$R^2 = 0.988 \quad DW = 1.465$$

$$M_t = 106.22 - 1.0385 (Ne - L)_{t-1} \quad (2-7)$$

(33.63) (0.279)

$$R^2 = 0.500 \quad DW = 1.504$$

$$W_t = 2657 (1.017)^t \quad (2-8)$$

(0.0011)

$$R^2 = 0.944 \quad DW = 1.533$$

#### Identities

$$(Pe)_t = (Po)_{t-1} + (B - D) (Po)_{t-1} \quad (2-9)$$

$$(No)_t = 0.4009 (Pe)_t + 0.4009 M_t \quad (2-10)$$

$$(V_2)_t / (V_1)_t = 0.907 \quad (2-11)$$

$$(V_1)_t = S_t + X_t \quad (2-12)$$

$$U_t = (No)_t - L_t \quad (2-13)$$

$$k_t = (k_m)_t + (k_{nm})_t \quad (2-14)$$

#### Current Endogenous Variables

$X_t$	export income (i.e., income from product sales plus capital income from investment in other regions plus transfer payments from the federal government)
$S_t$	local service income
$(k_m)_t$	manufacturing capital stock
$(k_{nm})_t$	non-manufacturing capital stock
$(V_2)_t$	total produced income
$(Ne)_t$	expected labour supply (natural increase)
$M_t$	migration
$W_t$	annual wage per employee
$(Pe)_t$	expected population (natural increase)
$(No)_t$	labour supply (actual)

<sup>1</sup>See F. W. Bell, "An Econometric Forecasting Model for a Region", *Journal of Regional Science*, Vol. 7, No. 2, 1967, pp. 109-127.

<sup>2</sup>*Ibid*, p. 119.



$(V_1)_t$	total received income (local service income plus export income, i.e., income received but not produced in the region)
$U_t$	unemployment
$k_t$	total capital stock
determined variables	
$GNP_t$	gross national product
$(B-D)_t$	birth rate (per thousand) minus death rate (per thousand)
$(Ne-L)_{t-1}$	prospective unemployment lagged one period (difference between natural increase in the labour force and labour supply)
$(k_m)_{t-1}$	capital stock in manufacturing lagged one period
$(k_{nm})_{t-1}$	capital stock in non-manufacturing lagged one period
$k_{t-1}$	total capital stock lagged one period
$(Po)_{t-1}$	population (actual) lagged one period
$t$	time

The model consisting of equations (2-1), (2-2) and (2-12), which we can write as

$$X_t = \alpha_1 + \beta_1 GNP_t \quad (2-15)$$

$$S_t = \alpha_2 + \beta_2 (V_1)_t \quad (2-16)$$

$$(V_1)_t = S_t + X_t \quad (2-17)$$

The procedure used to obtain  $\hat{\alpha}_2$  and  $\hat{\beta}_2$ , estimates of  $\beta_2$  and  $\alpha_2$  respectively, involved:

a) the application of OLS to equation (2-15) to obtain a computed series,  $X^*_t$ , of the variable  $X_t$ .

b) the substitution of  $X^*_t$  and equation (2-16) into equation (2-17) to obtain

$$(V_1)_t = \frac{\alpha_2}{1-\beta_2} + \frac{1}{1-\beta_2} X^*_t \quad (2-18)$$

c) the application of OLS to (2-18) to obtain numerical values of the constant term and the coefficient of  $X^*_t$ , which we shall denote by  $x$  and  $y$  respectively, so that

$$\frac{\alpha_2}{1-\beta_2} = x \quad (2-19)$$

and

$$\frac{1}{1-\beta_2} = y \quad (2-20)$$

Equation (2-20) yields  $\hat{\beta}_2 = (y-1)/y$ , which substituted into (2-19) gives  $\hat{\alpha}_2 = x/y$ . This estimation procedure is questionable because equation (2-18) is not the true reduced form of the income block and there is no justification for regressing one endogenous variable,  $(V_1)_t$ , on another  $X_t$ . Consequently, the coefficients of (2-2) are likely to be biased and inconsistent<sup>3</sup>. This problem could be avoided by using the following estimation procedure:

First, apply OLS to (2-15) to obtain  $\hat{\alpha}_1$  and  $\hat{\beta}_1$ , estimates of  $\alpha_1$  and  $\beta_1$ .

Secondly, substitute (2-15) and (2-16) into (2-17) to obtain the true reduced form of the income determination sub-model

$$(V_1)_t = \frac{\alpha_1 + \alpha_2}{1-\beta_2} + \frac{\beta_1}{1-\beta_2} GNP_t \quad (2-21)$$

which contains no endogenous variables on the right-hand side.

Finally, apply OLS to (2-21) to obtain numerical values for the constant  $x'$ , and the coefficient of  $GNP$ ,  $y'$ , so that

$$\frac{\alpha_1 + \alpha_2}{1-\beta_2} = x' \quad (2-22)$$

and

$$\frac{\beta_1}{1-\beta_2} = y' \quad (2-23)$$

Solving equations (2-22) and (2-23) simultaneously yields

$$\hat{\alpha}_2 = \frac{\hat{\beta}_1 x' - \hat{\alpha}_1 y'}{y'} \text{ and } \hat{\beta}_2 = 1 - \frac{\hat{\beta}_1}{y'}$$

Due to this indirect estimation procedure, the standard errors in equation (2-2) as well as the coefficient  $R^2$  are not given. The two investment equations (2-3) and (2-4) were estimated after  $X_t$  and  $S_t$  were replaced by their computed values  $X^*_t$  and  $S^*_t$  respectively. For the production function (2-5), estimates of the exponents were obtained from factor shares accruing to capital and labour. The remaining equations were estimated by Ordinary Least Squares.

Most of the statistical series used to estimate the model were taken directly from

standard sources. A few series, such as export income and capital stock, were not readily available and had to be estimated. Export income consists of two components; wages and salaries originating in the export sector, and profits originating in the same sector. The first component was estimated by the use of location coefficients<sup>4</sup>. The second component was derived by using the personal income series for Massachusetts as a benchmark, and making adjustments upward for dividends at the regional level and imputed interest. First, receipts of government interest were eliminated, then dividends were proportionally increased so as to include undistributed corporate profits, inventory valuation adjustment and corporate profit tax liability, using the national ratio of total corporate profits to dividends. Finally, imputed interest was increased by the amount of interest previously written off as business expense.

Data for manufacturing capital stock were taken from the Annual Census by the Massachusetts Department of Labor and Industries. These stock series were adjusted by using Creamer's<sup>5</sup> deflators for working and fixed capital at the two-digit industrial level. The stock figures for non-manufacturing capital were first computed at the national level for five major non-manufacturing sectors from data available in W. Leontief, "Factor Proportions and the Structure of American Trade", *Review of Economics and Statistics*, Vol. 38 (1961) pp. 386-407. These national stock figures for non-manufacturing capital were then scaled down to the regional level for Massachusetts, using the Cobb-Douglas production function. All income data were deflated using the Schultze and Tryon<sup>6</sup> index for income originating.

The predictive accuracy of the Massachusetts model was remarkably high. Although it was primarily designed for long-term forecasting the model also predicted accurately the short-term fluctuations in labour demand. The model was used to project the supply and demand for labour in the region for the period 1966-80, given the regional birth and death rates and the rate of growth in GNP. It was found that if the growth rate in GNP is 2.9 per cent, the unemployment rate in the region will be reduced from 5.7 per cent in 1966 to 5.5 per cent in 1980. However, if GNP grows by 4.9 per cent a year in the period 1966-80, the rate of unemployment will drop to 3.0 per cent by the end of the period.

<sup>3</sup>See Appendix B.

<sup>4</sup>The concept of location coefficient is explained in Section 2.4.

<sup>5</sup>See D. Creamer, *Capital Expansion and Capacity in Postwar Manufacturing*. Studies in Business Economics No. 72, New York: National Conference Board, Inc., 1961.

<sup>6</sup>See C. L. Schultze and J. L. Tryon, *Prices and Costs in Manufacturing Industries. Study Paper No. 17 prepared for the Joint Economic Committee, Washington, D.C., Government Printing Office, 1960.*



### 2.3 The Econometric Model of the State of Ohio

The designers of the Ohio model are W. L. L'Esperance, G. Nestel and D. Fromm<sup>7</sup> of the Ohio State University. The purpose of the model was, essentially, to perform policy analysis by considering alternative values of one exogenous variable, namely, prime military contracts awarded in Ohio. As in the case of Massachusetts, this model was developed along Keynesian lines, but its size is somewhat larger consisting of sixteen behavioural equations and eleven identities in twenty-seven current endogenous variables. The Ohio model divides the State economy into five major sectors; consumer, investment, state fiscal, output and personal income, and federal income tax.

The authors developed a set of economic accounts for estimating the gross state product (GSP) of Ohio by industry for the period 1955-65 using the value-added method introduced by Kendrick and Jaycox<sup>8</sup>. In constructing GSP, three major economic sectors were distinguished; farm, private non-farm and government. Estimates of gross farm product in Ohio are published by the U.S. Department of Agriculture.

Data for private non-farm income by state are available from the U.S. Department of Commerce for income received but not for income originating. The latter includes, in addition to wages and salaries, corporate profits and net interest. The state's income received was inflated to an income-originating basis using the national ratios of income originating to income received in each of the industry groups. This procedure is based on the assumption that the factor shares within each industry group of the state are the same as those of the nation.

The gross government product consists of wages and salaries of government employees, including military personnel. Data on wages and salaries at the state level are available from the U.S. Department of Commerce. Since supplements to wages and salaries were unavailable this item was estimated by applying "the national federal, state and local governments ratio of income originating to wages and salaries to each of Ohio's federal, state and local government wages and salaries figure."<sup>9</sup>

The Ohio model was estimated on the basis of fifteen annual observations for the period 1949-63. All data were converted to constant 1958 dollars. Unfortunately, there is no mention in the study of the method

used to deflate the series. The equations of the model are shown below. The numbers in

parentheses below the coefficients are  $t$  values.

#### Behavioural Equations

$$R = 3.757 + 0.304 \text{ DPI} \quad (10.01) \quad (14.27) \quad (2-24)$$

$$R^2 = 0.94 \quad DW = 0.84$$

$$A = -0.952 + 0.278 \text{ DPI} + 0.632 \frac{\Delta AC}{AC} - 0.764 \text{ AR}_1 \quad (-2.01) \quad (2.90) \quad (2.09) \quad (-1.81) \quad (2-25)$$

$$R^2 = 0.77 \quad DW = 1.44$$

$$I_{sma} = 0.288 + 0.263 I_{mma} - 0.058 \text{ RCB} \quad (2.85) \quad (2.82) \quad (-3.48) \quad (2-26)$$

$$R^2 = 0.67 \quad DW = 1.66$$

$$I_{mma} = -1.150 + 0.144 \text{ IGF}_{ma} + 0.384 \text{ IGF}_{ma-1} + 0.010 I_{sma-1} + 0.064 \text{ RTBS} \quad (-2.65) \quad (1.42) \quad (4.06) \quad (2.09) \quad (1.71) \quad (2-27)$$

$$R^2 = 0.63 \quad DW = 1.98$$

$$\text{IGF}_{ma} = 0.501 + 0.156 \Delta \text{GSP}_{ma} + 0.193 \text{GSP}_{ma} \quad (2.40) \quad (4.40) \quad (10.35) \quad (2-28)$$

$$R^2 = 0.92 \quad DW = 1.02$$

$$\text{PI} = -2.554 + 0.879 \text{ GSP} - 0.265 \Delta \text{GSP} \quad (-2.77) \quad (24.67) \quad (-3.17) \quad (2-29)$$

$$R^2 = 0.98 \quad DW = 0.49$$

$$\text{FIT} = -0.995 + 0.173 \text{ PI} \quad (-3.29) \quad (11.53) \quad (2-30)$$

$$R^2 = 0.94 \quad DW = 1.01$$

$$\Delta \text{GSP}_{ma} = -0.515 + 0.115 \Delta \text{GNP}_{ma} + 0.263 \text{ MPC} \quad (-5.18) \quad (21.90) \quad (3.39) \quad (2-31)$$

$$R^2 = 0.97 \quad DW = 1.38$$

$$\text{GSP}_{td} = -1.835 + 0.269 A + 0.584 R \quad (-3.26) \quad (0.86) \quad (5.61) \quad (2-32)$$

$$R^2 = 0.96 \quad DW = 0.76$$

$$\text{GSP}_{cc} = -0.055 + 2.344 I_{sma} + 0.013 \text{ HP} \quad (-0.26) \quad (6.93) \quad (3.94) \quad (2-33)$$

$$R^2 = 0.85 \quad DW = 1.58$$

$$\text{GSP}_{fi} = -1.039 + 0.203 \text{ DPI} - 0.085 \Delta \text{DPI} \quad (9.211) \quad (32.02) \quad (-2.76) \quad (2-34)$$

$$R^2 = 0.99 \quad DW = 1.06$$

$$\text{GSP}_{so} = -0.463 + 0.148 \text{ DPI} - 0.028 \Delta \text{DPI} \quad (-3.18) \quad (18.14) \quad (-0.70) \quad (2-35)$$

$$R^2 = 0.97 \quad DW = 0.79$$

$$\Delta \text{GSP}_{(other)} = 0.016 + 0.091 \Delta \text{GSP}_{(known)} \quad (0.64) \quad (5.19) \quad (2-36)$$

$$R^2 = 0.45 \quad DW = 1.73$$

$$F_t = -0.115 + 0.902 \text{ AR} \quad (-1.59) \quad (37.76) \quad (2-37)$$

$$R^2 = 0.99 \quad DW = 0.92$$

$$\Delta \text{AR} = 0.107 + 0.170 A - 0.087 \text{ AR}_1 \quad (2.77) \quad (4.90) \quad (-4.88) \quad (2-38)$$

$$R^2 = 0.95 \quad DW = 2.02$$

$$T_s = -0.085 + 0.028 C \quad (4.07) \quad (14.00) \quad (2-39)$$

$$R^2 = 0.93 \quad DW = 2.23$$

<sup>7</sup>See W. L. L'Esperance, G. Nestel and D. Fromm, "Gross State Product and An Econometric Model of A State." *Journal of the American Statistical Association*, Vol. 64, No. 327 (September, 1969) pp. 787-807.

<sup>8</sup>See J. W. Kendrick and C. M. Jaycox, "The Concept and Estimation of Gross State Product", *The Southern Economic Journal*, Vol. XXXII, No. 2 (October, 1965) pp. 153-68.

<sup>9</sup>L'Esperance, *Op. Cit.* p. 789.



## Identities

$$C = A + R \quad (2-40)$$

$$I_{ms} = I_{sma} + I_{mma} \quad (2-41)$$

$$Y = PI - FIT \quad (2-42)$$

$$\Delta DPI = DPI - DPI_{-1} \quad (2-43)$$

$$\Delta GSP = \Delta GSP_{(other)} + \Delta GSP_{(known)} \quad (2-44)$$

$$GSP = GSP_{-1} + \Delta GSP \quad (2-45)$$

$$GSP_{(known)} = GSP_{ma} + GSP_{cc} + GSP_{td} + GSP_{so} + GSP_{fi} + GSP_{fg} + GSP_{slg} \quad (2-46)$$

$$\Delta GSP_{(known)} = GSP_{(known)} - GSP_{(known)-1} \quad (2-47)$$

$$GSP_{(other)} = GSP_{(other)-1} + \Delta GSP_{(other)} \quad (2-48)$$

$$GSP_{ma} = GSP_{ma-1} + \Delta GSP_{ma} \quad (2-49)$$

$$AR = AR_{-1} + \Delta AR \quad (2-50)$$

## Current Endogenous Variables

$R$  retail sales in Ohio excluding new-car dealer sales

$R_{nc}$  sales by new car dealers in Ohio

$I_{sma}$  investment expenditures for plant (structures) by all manufacturing establishments in Ohio

$I_{mma}$  investment expenditures in machinery by all manufacturing establishments in Ohio

$IGF_{ma}$  internally generated funds in manufacturing

$PI$  personal income in Ohio

$FIT$  federal income taxes of Ohio

$\Delta GSP_{ma}$  annual change in GSP originating in manufacturing

$GSP_{td}$  gross state product in trade

$GSP_{cc}$  gross state product in contract construction

$GSP_{fi}$  gross state product in finance, insurance and real estate

$GSP_{so}$  gross state product in services and other

$F_t$  gallons of taxable motor fuel sold in Ohio

$\Delta AR$  annual change in automobile registrations in Ohio

$T_s$  retail sales tax receipts

$C$  sales by all establishments selling at the retail level in Ohio

$I_{ms}$  total investment expenditures for plant and machinery

$DPI$  Ohio disposable personal income

$\Delta DPI$  annual change in disposable personal income

$\Delta GSP$  annual change in Ohio's gross state product

$GSP$  Ohio's gross state product

$GSP_{(known)}$  defined in identity (2-46)

$\Delta GSP_{(known)}$  annual change in  $GSP_{(known)}$

$GSP_{(other)}$  the sum of gross state products in agriculture, mining, transportation, communication and public utilities

$\Delta GSP_{(other)}$   $GSP_{(other)} - GSP_{(other)-1}$

$GSP_{ma}$  gross state product in manufacturing

$AR$  automobile registrations in Ohio

## Exogenous Variables

$AC$  dollars of automobile instalment credit outstanding in the U.S.

$\Delta GNP_{ma}$  change in GNP in manufacturing

$GSP_{fg}$  gross state product in federal government

$GSP_{slg}$  gross state product in state and local government

$HP$  new housing units authorized in permit issuing outlets in Ohio

$MPC$  military prime contracts awarded in Ohio

$RCB$  interest rate on corporate bonds

$RTBS$  interest rate on 90-day U.S. Treasury Bills

Prior to its estimation the identification of the model was established by using the order condition for identifiability, which is necessary but not sufficient. It was found that all equations were over-identified. The Ohio

model is essentially interdependent, although two blocks of equations form recursive sub-models. Each equation in the model was estimated by both Ordinary Least Squares (OLS) and Two-Stage Least Squares

(TSLS). The equations presented above are those estimated by TSLS.

The Ohio model was used to study policy implications resulting from changes in military prime contracts awarded in the State.



During the Korean War in 1951 Ohio's share of the U.S. total military prime contracts awarded was 6.9 per cent, but by 1965 it had dropped to only 3.2 per cent. If Ohio had retained its peak share during the period 1954-64, the model predicts that the rate of growth of GSP would have increased from 0.52 per cent in 1954 to 7.54 per cent in 1964.

#### 2.4 The Econometric Model of the State of Georgia

The Georgia model is the oldest of all regional models surveyed in this Chapter. It was designed by Henry Thomassen<sup>10</sup> of the Prudential Insurance Company of America, for the purpose of appraising the growth potential of Georgia State in terms of national and regional income influences, technological change, population increase and other growth factors.

Thomassen first established the dependence of Georgia's industries upon national aggregates by considering the relative employment concentrations in the various industries using location coefficients. A location coefficient,  $L_i$ , of industry  $i$  in the state is defined as

$$L_i = \left[ \frac{(E_s)_i}{\sum (E_s)_i} \right] \cdot \left[ \frac{\sum (E_n)_i - \sum (E_s)_i}{(E_n)_i - (E_s)_i} \right]$$

where  $(E_s)_i$  denotes employment in industry  $i$  in the state and  $(E_n)_i$  is employment in industry  $i$  in the nation. For any state industry  $i$  if  $L_i$  is greater than one, it is concluded that the state has a comparative advantage in this line of production and therefore, industry  $i$  is judged as export-oriented. Conversely, if  $L_i$  is less than one the industry is judged as local.

Using location coefficients the author classified twenty-one major industries in Georgia into three groups:

- a) Local
- b) Export-oriented to the Southeast region excluding Georgia
- c) Export-oriented to the rest of the United States.

Having determined the national, regional and local dependency of Georgia industries, Thomassen estimated twenty-two employment functions, one for each industry plus one for government employment. All functions were of the following statistical form:

$$E_i = \alpha + \beta Y$$

where  $E_i$  is employment (thousands of

workers) in the  $i$ th industry in Georgia,  $Y$  denotes income (billions of 1947-49 dollars), and  $\beta$  is the employment multiplier. The income variable was different for each of the industry groups. In the case of local industries  $Y$  denoted income of the state of Georgia, whereas for groups (b) and (c)  $Y$  represented income of the Southeast region and the U.S. respectively. The equations were estimated on the basis of seven annual observations for the period 1947-54 from data available in the Statistical Abstract of the United States, 1956. The standard errors of the estimated coefficients and the coefficients of multiple determination are not given.

The Georgia model was used to project employment in the state by industry for the period 1955-60, on the assumption that income in the U.S., the Southeast region and Georgia would grow at the rate of 4.9 per cent, 4.4 per cent and 5.5 per cent respectively. Among the U.S.-oriented export industries, those producing non-durables had the greatest impact on employment, contributing 27,500 new jobs. From the Southeast oriented export industries, wholesale and retail trades showed the greatest increase in employment — about 51,000 workers, while construction was the most significant local industry adding over 20,000 workers.

#### 2.5 The Econometric Model of the State of Michigan

The econometric model of Michigan was prepared by the Research Seminar in Quantitative Economics of the University of Michigan,<sup>11</sup> under the directorship of Daniel B. Suits, for the Michigan Department of Commerce. The model is essentially a forecasting device for preparing short-term forecasts of the Michigan economy. It relates Michigan's economic performance to various national variables, taken as exogenous, the most important of them being the national demand for motor vehicles and parts, and the demand for new durable equipment.

The study was written in non-technical terms and the statistical relationships are not explicitly stated. It is difficult to judge the size of the Michigan model; it appears that it consists of about thirty equations explaining annual changes in gross state product and its major components, retail sales, labour force employment and unemployment, personal income by major categories, population and state taxes.

For the most part the statistical series used to estimate the model relate to the period 1949-63 and are expressed in constant 1954 dollars. Estimates of gross state product were obtained on the basis of value-added by each industrial sector. The value-added figures for the manufacturing sector were taken from the *Annual Survey of Manufactures*. Because these figures include purchases of services from other industries, they were adjusted by applying the ratio of U.S. GNP in manufacturing to U.S. manufacturing value-added.

For the mining sector, value-added estimates are available from the U.S. Census of Mineral Industries taken every four years. "The intervening years were interpolated by estimating the change of the ratio of value-added to personal income from mining as a linear trend between the census years and applying this ratio to the figures for personal income from mining."<sup>12</sup>

Estimates of income originating in other industrial sectors within Michigan were obtained by using the ratio of GNP originating in each sector to personal income from that sector for the U.S. as a whole. The series for all industrial sectors were deflated using national price deflators. For some categories of retail sales the deflators used were relating to the City of Detroit.

The model was employed for making a forecast of Michigan's gross state product in the year 1966.

#### 2.6 The Econometric Model of the Province of Nova Scotia

The econometric model of Nova Scotia was designed by Dr. S. Czamanski<sup>13</sup> of the Institute of Public Affairs, Dalhousie University on behalf of the Nova Scotia Voluntary Planning Board. This is the first model that was constructed for a province in Canada. The purpose of the Nova Scotia model was, essentially, to provide an analytical tool for testing alternative policies for long-term regional planning. Unlike the above models of states, which are crudely specified in terms of sectors, the Nova Scotia model treats comprehensively the various sectors of the provincial economy. Its target variables denote welfare indexes which measure the educational, health and economic standards of the people. The model contains the following structural equations:

<sup>10</sup>See H. Thomassen, "A Growth Model for A State", *Southern Economic Journal*, Vol. XXIV, No. 2 (October, 1957), pp. 123-139.

<sup>11</sup>Econometric Model of Michigan, *Technical Report No. 3, Research Seminar in Quantitative Economics, the University of Michigan*, (April, 1966).

<sup>12</sup>*Ibid*, p. 54.

<sup>13</sup>See S. Czamanski, *An Econometric Model of Nova Scotia*, Halifax: Institute of Public Affairs, Dalhousie University, 1968.



$X_{Is(t)} = 7,827 + 0.6497 K_{Is(t)}$ (4.7040)(6.5531) $R^2 = 0.7922$ $DW = 1.6505$	(2-51)	$F_{m(t)} = 1.869 + 0.0156 X_m$ (3.0689) $R^2 = 0.4022$ $DW = \text{not given}$	(2-66)
$Q_{Is(t)} = 2.49 X_{Is(t)}$ (12.5) $R^2 = 0.9176$ $DW = \text{not given}$	(2-52)	$F_{s(t)} = 0.0835 X_{cs(t)} + 0.3509 \bar{p}_{(t)}$ (3.7470) (5.4255) $R^2 = 0.9285$ $DW = 1.7623$	(2-67)
$e_{Is(t)} = 0.9848 Q_{Is(t)}$ (752.2053) $R^2 = 0.9994$ $DW = 1.8549$	(2-53)	$i_{p(t)} = -66.060 + 1.5133 NH_{(t)}$ (27.9972) $R^2 = 0.9801$ $DW = \text{not given}$	(2-68)
$E_{I(t)} = 2.643 + 1.1029 FZ_{(t)}$ (0.1790)(1.9040) $R^2 = 0.1338$ $DW = 0.2597$	(2-54)	$SIP_{(t)} = -4.022 + 0.0525 W_{(t)}$ (-1.9578) (12.5468) $R^2 = 0.9125$ $DW = 1.3600$	(2-69)
$E_{4(t)} = -80.696 + 0.4708 P_{u(t)}$ (-3.6023)(8.4261) $R^2 = 0.8333$ $DW = 0.3193$	(2-55)	$T_{(t)} = -31.933 + 0.0494 Y_{p(t)} + 293.944 t_{r(t)}$ (-3.5966)(6.7526) (1.7762) $R^2 = 0.9669$ $DW = 1.8360$	(2-70)
$E_{5(t)} = 24.061 + 0.6741 DF_{s(t)} - 2.0454 t$ (11.9162)(7.7784) (-7.7027) $R^2 = 0.8207$ $DW = 1.7141$	(2-56)	$C_{1(t)} = -225.407 + 2.1035 H_{(t-1)} + 0.4197 Y_{DP}$ (-2.3577)(2.6386) (8.3267) $R^2 = 0.9966$ $DW = 2.0583$	(2-71)
$I_{m(t)} = 1.1488 (GI_G + GS_m)_{(t-4)} + 0.0186 Z_{1(t-4)}$ (2.6590) (1.1821) $R^2 = 0.6404$ $DW = 1.7254$	(2-57)	$C_{4(t)} = -45.236 + 0.1682 Y_{DP} + 0.2461 P_u$ (17.4463) (3.5707) $R^2 = 0.9970$ $DW = \text{not given}$	(2-72)
$e_{m(t)} = 26.185 + 1.2436 GNP_{(t)} + 0.6672 \overset{C}{(\bar{p}_m - \bar{p}_m)}_{(t)}$ (2.9136)(3.1628) (2.3635) $\overset{NS}{\bar{p}_m - \bar{p}_m}_{(t)}$ $R^2 = 0.3932$ $DW = 1.9141$	(2-58)	$C_{5(t)} = -66.924 + 0.7370 NH_{(t)} + 0.1291 Y_{DP}$ (-7.5404)(2.4088) (5.3614) $R^2 = 0.9982$ $DW = 2.1316$	(2-73)
$X_{m(t)} = -239.599 + 1.2005 K_{m(t)}$ (-10.7214)(19.8214) $R^2 = 0.9727$ $DW = 1.5105$	(2-59)	$T_{c(t)} = 12.624 + 0.0126 GRP_{(t)}$ (4.6854)(4.0166) $R^2 = 0.5022$ $DW = 1.4026$	(2-74)
$E_{3(t)} = 0.0304 X_{m(t)} + 0.3795 SZ_{(t)}$ (2.8514) (17.7193) $R^2 = 0.6261$ $DW = 1.3214$	(2-60)	$T_{IN(t)} = -35.363 + 0.2469 Y_E$ (-5.5414) (29.0736) $R^2 = 0.9837$ $DW = 2.1291$	(2-75)
$X_{cs(t)} = -629.923 + 9.2050 E_{4(t)}$ (-8.0764)(12.2848) $R^2 = 0.9448$ $DW = 1.9770$	(2-61)	$e_{L(t)} = 25.989 + 0.2184 GNP_{(t)}$ (13.7490)(3.8913) $R^2 = 0.4853$ $DW = 0.9704$	(2-76)
$I_{cs(t)} = 0.1079 X_{cs(t)} + 6.2032 i_{(t)}$ (2.7744) (2.4635) $R^2 = 0.8024$ $DW = 1.6936$	(2-62)	$\log e_{A(t)} = 1.5110 \log F\beta + 0.3954 \log \sum_{t=1}^4 GS_{A(t)}$ (22.5825) (4.5464) $R^2 = 0.8114$ $DW = 1.4292$	(2-77)
$I_{H(t)} = 14.714 + 0.1450 \Delta GRP + 1.6289 GS_{H(t)}$ (2.5542)(1.8159) (4.2178) $R^2 = 0.6099$ $DW = 1.7120$	(2-63)	$m_{(t)} = 0.3969 Y_{E(t)} + 0.2860 (X_L + X_{IS} + X_m)_{(t)}$ (12.0557) (4.8400) $+ 0.337 I_{(t)} + 0.9173 DF_{s(t)}$ (2.8554) (4.7760) $R^2 = 0.9977$ $DW = 2.8846$	(2-78)
$\log W_{(t)} = -2.1494 + 0.7742 \log GRP_{(t)} + 0.6382 \log \bar{p}_{(t)}$ (-1.8830) (8.4429) (1.8587) $R^2 = 0.9916$ $DW = 1.0947$	(2-64)	$M_{(t)} = -3.007 + 0.3718 D^L_{(t-1)}$ (2.5349) $R^2 = 0.3687$ $DW = \text{not given}$	(2-79)
$F_{(t)} = -22.245 + 0.0428 A_{L(t)} + 0.5177 FZ_{(t)}$ (-9.1337)(8.2933) (4.5502) $R^2 = 0.9430$ $DW = 2.0261$	(2-65)		



$$q_{e(t)} = 24.920 + 0.2603 \text{ GI}_{ED(t)} \quad (2-80)$$

(50.4639)(4.1680)

$R^2 = 0.6208 \quad DW = 2.3583$

$$q_{v(t)} = 220.858 + 17.8200 \text{ GI}_{v(t)} \quad (2-81)$$

(14.2888) (3.5096)

$R^2 = 0.3947 \quad DW = 0.4443$

## Endogenous Variables

$X_{Is}$	value added in iron and steel industry
$Q_{Is}$	value of shipments in iron and steel industry
$e_{Is}$	exports of iron and steel
$E_1$	employment in agriculture, forestry and fisheries
$E_4$	employment in commercial services
$E_5$	government employment
$I_m$	investment in manufacturing, including construction industry
$e_m$	exports of manufactured products
$X_m$	value added by manufacturing
$E_3$	employment in manufacturing
$X_{cs}$	value added in commercial services
$I_{cs}$	investment in commercial services
$I_H$	investment in housing
$W$	total wage income
$F_a$	net income of farm operators
$F_m$	net income of unincorporated manufacturing
$F_s$	net income in unincorporated service enterprises
$i_p$	interest, dividends and rental income of persons
$SIP$	contributions to social insurance and government pension plans
$T$	total personal income taxes
$C_1$	consumption of manufactured and agricultural products
$C_4$	consumption of services and travel expenditures
$C_5$	rents and interest payments by households
$T_c$	corporate profit taxes
$T_{IN}$	total indirect taxes
$e_L$	exports of mining products
$e_A$	exports of agricultural, forestry and fishing products
$m$	total imports
$M$	balance of migrations
$q_e$	index of educational standards

$q_v$	index of health standards
$K_{Is}$	total capital invested in iron and steel industry
$Y_p$	total personal income
$Y_{DP}$	total personal disposable income
$GRP$	gross regional product
$Y_E$	total personal expenditures
$I$	total investments
$D^L$	unsatisfied demand for labour
$K_m$	total capital invested in manufacturing
$t_r$	average rate of direct personal taxes

## Exogenous Variables

$FZ$	number of commercial farms as a proportion of all farms
$P_u$	total urban population
$DF_s$	payments to military personnel
$t$	time
$GI_G$	direct general government investments
$GS_m$	government subsidies and investments in manufacturing
$Z_1$	index of relative accessibility to markets
$GNP$	Canadian gross national product
$C$	price index of manufactured goods in Canada (1949 = 100)
$\bar{P}_m$	
$NS$	price index of manufactured goods in Nova Scotia (1949 = 100)
$\bar{P}_m$	
$NS$	consumer price index for Nova Scotia (1949 = 100)
$\bar{P}$	
$SZ$	index of average size of plant
$i$	rate of interest on loans
$\Delta GRP$	annual change in gross regional product
$GS_H$	government subsidies in housing and commercial services
$A_L$	amount of cultivated land
$NH$	number of housing units constructed after 1920
$H$	number of households
$F\beta$	number of fishing boats
$GS_A$	government subsidies in agriculture, forestry and fisheries
$X_L$	value added by mining
$GI_{ED}$	direct government investments in education and training
$GI_v$	direct government investments in health and welfare



In addition to the above 31 stochastic equations, the Nova Scotia model contains 23 identities, thus explaining a total of 54 endogenous variables of the provincial economic system. The model is also connected with a population and migration sub-model consisting of a system of matrices. The characteristic features of Dr. Czamanski's model are, first its non-linearity, in view of the presence of non-linear relationships, such as, (2-64) and (2-77), and secondly, its recursiveness, which justified the use of OLS in estimating the equations.

The numbers in parentheses below the estimated coefficients in equations (2-51) to (2-81) indicate t values. The sample period of 1947-65 provides 19 annual observations, hence, the critical values of the t statistic at the 5 per cent probability level is above 2.00 for 17 degrees of freedom or less. Consequently, any coefficient whose calculated t value is less than 2.00 lacks significance, i.e., the coefficients in equation (2-54), the coefficient of variable  $Z_1$  in equation (2-57), the coefficient of  $\Delta\text{GRP}$  in (2-63) etc. The coefficient of multiple determination (unadjusted) is high for most equations. However, the goodness of fit is not satisfactory in equations (2-57), (2-60), (2-63) and (2-80), and quite poor in equations (2-54), (2-58), (2-56), (2-74), (2-76), (2-79) and (2-81).

The critical values (lower and upper bounds) of the Durbin-Watson d statistic are 1.18-1.40 in the case of one independent variable, and 1.08-1.53 for two independent variables. Hence, on the basis of the computed DW values we can detect the presence of positive autocorrelation in relationships (2-54), (2-55), (2-76) and (2-81). Autocorrelation may also exist in (2-59), (2-60), (2-64), (2-69) and (2-77) since the test is inconclusive.

The statistical data used to estimate the Nova Scotia model were either obtained directly from DBS sources or estimated by the Institute of Public Affairs, which was responsible for the development of a set of income and product accounts for the Province. It is interesting to mention the methods employed in the derivation of certain estimated series. The index of educational standards,  $q_e$ , was estimated as a combination of the number of classrooms per 1,000 population in the age group 6-20, and the number of school and college students. The index of health standards,  $q_v$ , was derived by combining three variables, namely, the number of doctors, the number of hospital beds and

the public health expenditures, using the method of principal components.

The capital stock series for manufacturing,  $K_m$ , was derived by using as a benchmark the stock estimate for 1949 available in S. W. Sametz et. al., *The Economic Geography of Canada*, Toronto: Macmillan, 1964. To obtain capital stock estimates for other years, net investment (gross investment less 5 per cent capital depreciation) was added each year to the 1949 stock value. Finally, the estimated capital stock series was adjusted for prices using Canadian price indexes.

The Nova Scotia model has been used to analyse the effects of changes in exogenous variables on the endogenous variables in 1961. This operation, referred to as "sensitivity analysis", consists of doubling the values of one exogenous variable at a time and solving the model for the endogenous variables. The results of this experiment indicated that a one hundred per cent increase in defence spending in Nova Scotia would raise GRP by 21.9 per cent, and total employment by 16.9 per cent, whereas a one hundred per cent increase in Canadian GNP would increase Nova Scotia exports of manufactured goods by 87.4 per cent and exports of mining products by 23.6 per cent.

Another type of test performed on the model was to simulate yearly solutions for the endogenous variables for 1954-61. The discrepancy between the actual and solution values for the endogenous variables was less than ten per cent, and in most cases less than five per cent. Finally, the model was em-

ployed in making *ex post* forecasts within the sample period. The difference between the yearly solutions and forecasts is that in the latter the value of lagged endogenous variables are generated by the model. It was found that the forecasting ability of the model was, on the whole, satisfactory. However, no attempt was made to provide *ex ante* forecasts beyond the observation period.

## 2.7 The Econometric Model of the Province of Prince Edward Island

The model of Prince Edward Island is the most recent of the studies discussed in this Chapter. The project was initiated by Mr. Michael Lane and was completed by Mr. Frank Schwartz<sup>14</sup> under the direction of Mr. Keith Wornell of the Department of Finance, P.E.I. This is, essentially, a policy model designed to provide an in-depth analysis of the P.E.I. economy and to study the effects of alternative program mixes within the framework of the 15-year Development Plan for the Province, initiated in 1969 in collaboration with the Federal Department of Regional Economic Expansion.

The model divides the P.E.I. economy into nine sectors: Agriculture, Fisheries, Construction, Manufacturing, Output, Population, Government, Income and Welfare. The design of the model was based on Tinbergen's targets-instruments approach. It contains 33 stochastic equations and nine identities explaining 42 endogenous provincial variables as follows:

### Stochastic Equations

$$F_A = 55.9397 + 0.6578 P_{AC} + 0.1755 P_{A(t-1)} - 0.0011 Y_{A(t-1)} \quad (2-82)$$

(6.858)            (1.895)            (- 2.749)

$$R^2 = 0.9462 \quad DW = 0.9877$$

$$K_A = 126326.47 + 10.6892 CDT_A - 398.058 SQZ_A \quad (2-83)$$

(3.739)            (- 5.92)

$$R^2 = .8619 \quad DW = 1.8625$$

$$OP_A = 11966.117 + 0.1366 K_A + 118.1064 \% C_A \quad (2-84)$$

(4.743)            (3.013)

$$R^2 = .8562 \quad DW = 1.3376$$

$$\bar{Y}_A = -776.6976 + 0.1368 VA_A + 10.8355 F_A - 0.0219 K_A + 5.954 P_A \quad (2-85)$$

(10.377)            (2.831)            (- 5.808)            (2.629)

$$R^2 = .9629 \quad DW = 1.5821$$

$$K_{FIS} = -13.1177 + 0.6391 K_{FIS(t-1)} + 44.4679 P_{FIS(t-1)} \quad (2-86)$$

(7.954)            (9.364)

$$- 0.6533 Y_{UE} - 22.3379 P_{FI}$$

(- 4.973)            (- 5.265)

$$R^2 = .9328 \quad DW = 1.7190$$

<sup>14</sup>Frank Schwartz, *An Econometric Model of P.E.I., Research Monograph, Department of Finance, P.E.I., Sept. 1970.*



$$E_{FIS} = 3205.6816 - 0.23 K_{FIS(t-1)} - 23.5759 P_{FL} + 30.5421 P_{FIS} \quad (2-87)$$

(− 7.827)      (− 4.038)      (4.781)

$R^2 = .8650$      $DW = 2.4131$

$$K_{FOS} = 59.8168 + 0.8101 CDT_{FOS} + 51.6463 B_{FOS} \quad (2-88)$$

(7.974)      (8.483)

$$- 32.2706 R_{FOS(t-1)} - 64.6292 C_{FOS(t-1)}$$

(− 4.556)      (− 2.726)

$R^2 = .9820$      $DW = 2.4278$

$$OP_{FOS} = 45.5082 + 0.3430 K_{FOS} + 15.523 C_{FOS} \quad (2-89)$$

(15.437)      (2.049)

$R^2 = .9589$      $DW = 1.6366$

$$E_{FOS} = - 17.9909 + 0.0541 OP_{FOS(t-1)} + 0.0124 I_{FOS} \quad (2-90)$$

(9.559)      (5.232)

$$+ 0.2695 P_{FOS(t-1)} + 2.9335 B_{FOS}$$

(3.51)      (11.727)

$R^2 = .9864$      $DW = 1.8942$

$$R_{FOS} = 2.918 - 0.0096 K_{FOS} + 0.004 CDT_{FOS} + 0.2707 B_{FOS} + 0.35 R_{FOS(t-1)} \quad (2-91)$$

(− 7.923)      (4.82)      (2.308)      (2.555)

$R^2 = .9518$      $DW = 1.6226$

$$L = 2.3702 + .9223 e_L \quad (2-92)$$

(22.774)

$R^2 = .9622$      $DW = .7218$

$$OP_{CR} = - 83910.047 + 906.0433 POP - 0.7871 MIG - 1170.3034 \bar{t}(Y_P) \quad (2-93)$$

(6.912)      (− 2.603)      (− 1.795)

$R^2 = .9068$      $DW = 2.279$

$$OP_{CI} = 1861.82 + 1.7133 PG_{PW} \quad (2-94)$$

(8.179)

$R^2 = .8069$      $DW = 1.765$

$$VA_{CT} = 4335.4287 + 0.3068 OP_{CT} \quad (2-95)$$

(9.951)

$R^2 = .8684$      $DW = 1.401$

$$E_C = 2074.2871 + 0.1141 Y_{IR(t-1)} + 0.0735 OP_{CT} - 0.0169 GPP \quad (2-96)$$

(1.821)      (8.984)      (− 3.745)

$R^2 = .8765$      $DW = 2.289$

$$W_C = 3909.4428 + 0.1823 VA_{CT(t-1)} + 2.6377 E_C + 0.5671 Y_{IR} \quad (2-97)$$

(1.778)      (5.778)      (4.321)

$R^2 = .9400$      $DW = 1.707$

$$\bar{W}_M = - 10.6525 + 0.4417 \bar{W}_{M(t-1)} + 30.0423 DCPI + 0.00007 GPP \quad (2-98)$$

(3.242)      (2.69)      (3.818)

$R^2 = .9534$      $DW = 1.6604$

$$W_M^T = - 539.6552 + 0.0207 GPP + 0.2519 VA_{M(t-1)} + 0.2104 I_{M(t-1)} \quad (2-99)$$

(3.445)      (2.903)      (2.441)

$R^2 = .9860$      $DW = 2.1554$

$$E_M = 2833.8901 + 0.2113 W_M^T + 28.4231 PS1_M - 23.4982 PS2_M \quad (2-100)$$

(12.174)      (3.320)      (− 8.231)

$$- 13.3712 \bar{W}_M$$

(− 3.002)

$R^2 = .9693$      $DW = 2.0176$

$$OP_M = - 7435.8603 - 17.7621 E_M - 46.2972 ESTB_M + 440.0719 JOWN \quad (2-101)$$

(5.819)      (− 1.756)      (2.136)

$R^2 = .9477$      $DW = 1.3566$



$$VA_M = -2624.7939 + 0.3671 OP_M \quad (2-102)$$

(18.865)

$$R^2 = .9493 \quad DW = 1.2052$$

$$GPP = -74353.1564 + 2155.1377 PPR + 0.00332 GNP \quad (2-103)$$

(3.696) (26.131)

$$R^2 = .9822 \quad DW = 1.612$$

$$PG_{TR} = -12624.3066 + 0.2916 GPP - 0.2325 Y_A \quad (2-104)$$

(17.285) (-1.964)

$$R^2 = .9573 \quad DW = .8511$$

$$PG_{TEX} = 1323.0583 + 1.0979 PG_{TR} \quad (2-105)$$

(31.572)

$$R^2 = .9793 \quad DW = 2.0657$$

$$G_{XFR} = 6032.2216 + 0.4957 PG_{TR} + 578.5051 T - 0.0848 GPP \quad (2-106)$$

(7.153) (5.196) (-2.873)

$$R^2 = .9858 \quad DW = 2.194$$

$$E_{PG} = 106.8081 + 0.3181 W_G + 12.765 T - 0.0123 PG_{TEX} \quad (2-107)$$

(17.924) (1.909) (-2.983)

$$R^2 = .9718 \quad DW = 1.5307$$

$$MPA = -3667.6738 + 0.0002388 GNP \quad (2-108)$$

(17.024)

$$R^2 = .9324 \quad DW = .768$$

$$Y_{IR} = -1413.1169 + 0.6096 Y_{IR(t-1)} + 0.0303 GPP \quad (2-109)$$

(17.024)

$$R^2 = .9014 \quad DW = 1.898$$

$$WSS = -9765.6484 + 0.2543 GPP + 2.986 VA_M \quad (2-110)$$

(2.5551) (2.434)

$$R^2 = .9745 \quad DW = 0.985$$

$$JEDCN = -0.2454 + 0.0007 PG_{ED} + 0.0148 \bar{Y}_P \quad (2-111)$$

(2.666) (4.460)

$$R^2 = .9667 \quad DW = 1.1691$$

$$JHLTH = -660.7316 + 0.0272 POP_u + 0.0219 PG_{HLTH} + 0.7546 HB \quad (2-112)$$

(4.483) (3.229) (8.95)

$$R^2 = .9945 \quad DW = 1.2218$$

$$JHSNG = -1414.0637 + 2.7513 STRT_{(t-1)} + 14.9055 \bar{Y}_P + 2.9027 STRT \quad (2-113)$$

(1.431) (7.395) (1.662)

$$R^2 = .9189 \quad DW = 1.8142$$

$$JWLFR = -671.5286 + 0.4967 JHSNG + 0.5085 \bar{Y}_P + 0.0336 POP_u \quad (2-114)$$

(112.823) (8.97) (4.895)

$$R^2 = .9999 \quad DW = 1.4008$$

#### Identities

$$Y_A = \bar{Y}_A (\# F) \quad (2-115) \quad OP_{CT} = OP_{CR} + OP_{CI} + OP_{CC} \quad (2-120)$$

$$I_{FOS} = K_{FOS} - K_{FOS(t-1)} \quad (2-116) \quad OP_{CP} = OP_A + OP_{FIS} + OP_{FOS} + OP_{CT} + OP_M \quad (2-121)$$

$$e_{POP} = POP_{(t-1)} + NI(POP_{t-1}) \quad (2-117) \quad Y_P = Y_A + Y_{IR} + WSS + Y_{NUB} + G_{XFR} + MPA \quad (2-122)$$

$$e_{POP} = PPR(e_{POP}) \quad (2-118) \quad \bar{Y}_P = Y_P / POP \quad (2-123)$$

$$POP = e_{POP} - MIG \quad (2-119)$$



## Endogenous Variables

$F_A$	average farm size, agriculture
$K_A$	capital stock, agriculture
$OP_A$	output, agriculture
$\bar{Y}_A$	net income per farm, agriculture
$Y_A$	total net income, agriculture
$K_{FIS}$	capital stock, inshore fishery
$E_{FIS}$	employment, inshore fishery
$K_{FOS}$	capital stock, offshore fishery
$I_{FOS}$	net investment, offshore fishery
$OP_{FOS}$	output, offshore fishery
$E_{FOS}$	employment, offshore fishery
$R_{FOS}$	profitability, offshore fishery
$GPP$	gross provincial product (P.E.I.)
$e_{POP}$	expected population
$e_L$	expected labour force
$L$	actual labour force
$POP$	actual population
$Y_{IR}$	net rental and interest income of persons
$OP_{CR}$	output, residential construction
$OP_{CI}$	output, institutional construction
$OP_{CT}$	output, total construction
$VA_{CT}$	value added, total construction
$E_C$	employment, construction
$W_C$	total annual wage bill, construction
$\bar{W}_M$	average weekly wages and salaries, manufacturing
$W_M^T$	total annual wage bill, manufacturing
$E_M$	employment, manufacturing
$OP_M$	output, manufacturing
$VA_M$	value added, manufacturing
$PG_{TR}$	provincial government, total revenues
$PG_{TEX}$	provincial government, total expenditures
$G_{XFR}$	government transfers to persons
$E_{PG}$	employment, provincial government
$MPA$	military pay and allowances
$WSS$	wages, salaries and supplementary labour income
$Y_P$	total personal income
$\bar{Y}_P$	personal income per person
$OP_{CP}$	output, total construction
$JEDCN$	index of education

JHSNG index of housing standards

JHLTH index of health services

JWLFR index of general well-being

## Exogenous Variables

$PA_C$	cost price index, agriculture
$PA$	product price index, agriculture
$CDT_A$	credit used, agriculture
$SQZ_A$	price/cost squeeze, agriculture
$\%C_A$	proportion of commercial farms, agriculture
$POP_u$	urban population
$VA_A$	value added, agriculture
$P_{FIS}$	fish price index, inshore fishery
$Y_{UE}$	income from unemployment insurance payments
$P_{FL}$	fish price index, lobsters
$CDT_{FOS}$	credit used, offshore fishery
$B_{FOS}$	boats fishing, offshore fishery
$C_{FOS}$	boats constructed, offshore fishery
$P_{FOS}$	fish price index, offshore fishery
$PPR$	population participation rate
$GNP$	Canadian gross national product
$NI$	rate of natural increase of population (births minus deaths)
$MIG$	migrations from P.E.I.
$\bar{t}(Y_P)$	average personal income tax rate
$PG_{PW}$	total provincial government expenditures on public works
$OP_{CC}$	output, commercial construction
$I_M$	net investment, manufacturing
$PS1_M$	plant size indicator 1, manufacturing
$PS2_M$	plant size indicator 2, manufacturing
$ESTB_M$	number of establishments, manufacturing
$JOWN$	index of ownership, manufacturing
$T$	time
$W_G$	total annual wage bill, government
$PG_{ED}$	provincial government expenditures on education (ordinary)
$PG_{HLTH}$	provincial government total expenditures on health (ordinary plus capital)
$HB$	number of hospital beds
$STRT$	number of housing starts
$\#F$	number of farms, agriculture, thousands of units
$OP_{FIS}$	output, inshore fishery
$Y_{NUB}$	net income of non-farm unincorporated business



Due to the recursiveness of the model all equations were estimated by ordinary least-squares on the basis of annual data for the period 1946-68. Some of the equations were fitted to a shorter period ranging between 1946 and 23 observations.

The statistical results of the model are very satisfactory. The values of the coefficient of multiple determination (unadjusted) are quite high in every case explaining not less than 80 per cent and in most equations more than 90 per cent of the variation of the dependant variables. Most of the estimated coefficients are statistically significant as suggested by the calculated t-values given beneath the coefficients in parentheses. The computed values of the Durbin-Watson statistic indicate that in about 22 of the estimated equations the residuals are free from serial correlation.

The statistical data used to estimate the P.E.I. model were obtained directly from the sources or compiled by the Provincial Department of Finance which has undertaken the development of a comprehensive system of regional economic accounts. As in the model of Nova Scotia, the principal components method was employed to obtain the welfare indexes of education, health services and housing standards. All variables measured in dollars were deflated using specific price indexes for agriculture and fisheries, available from DBS statistics, and a general price index for the other sectors corresponding to the average of Halifax and St. John (N.B.) consumer price indexes.

The P.E.I. model was subjected to the same type of sensitivity analysis as the model of Nova Scotia. This analysis indicated the dependence of the province on the national economy and the importance of provincial government expenditures on the overall performance of the P.E.I. economy. It was found that a doubling of provincial government outlays on public works would raise the output of the construction industry by 42.4 per cent, employment in the same industry by 34.6 per cent, and the industry's wage bill by 27.8 per cent. Since the model was designed to be used for policy analysis no attempt was made to assess its forecasting ability or to make *ex ante* forecasts beyond the sample period.

## 2.8 Common Characteristics of Regional Models

The empirical studies discussed in this Chapter indicate the progress made in the

field of econometric model building at the provincial or state level, from 1957 when the Georgia model was published until recent years.

The model of Georgia is the simplest and the most crudely specified in terms of sectors, focusing on employment and ignoring other important sectors of the state economy. The Massachusetts model, published ten years later, is also centred on the employment sector, but there are three additional sectors for consumers, investment and exports. The defect of the model is that it does not contain any policy variables which can be controlled by the state government. In the Michigan model most of the state endogenous variables are directly correlated with national variables taken as exogenous without any *a priori* justification for specifying the equations in this particular manner. The model of Ohio is the only one specified in a way that resembles more closely the national models of the Klein-Goldberger type. The two Canadian models of Nova Scotia and P.E.I. are more comprehensive, relative to the state models, incorporating a greater number of sectors and placing emphasis on policy analysis rather than forecasting.

These models share some common features worth mentioning. First the monetary sector is entirely missing in every case. Secondly, although the models attempt to approximate open economies, the trade sector is either non-existent or specified in a manner that treats the national economy as the rest of the world. Finally, all models point to the severe data constraints existing at the sub-national level, and the need for developing a reliable data base required for their estimation.

## III SPECIFICATION OF THE ONTARIO ECONOMETRIC MODEL

### 3.1 The Purpose of the Ontario Model

The recently published Ontario interindustry model<sup>1</sup> and the Ontario economic accounts<sup>2</sup> mark the completion of two major projects of quantitative economic analysis initiated by the Economic Analysis Branch of the Economic and Statistical Services Division. The provincial accounts contain estimates of gross provincial product, personal consumption expenditures, business investment, government revenue and similar indicators of economic

activity for the period 1957-68. Such estimates, although useful in describing the movements of key economic variables over time, are quite inadequate in analysing the Ontario economic system for two reasons.

In the first place, the estimates in the accounts are highly aggregated and, thus, fail to reveal detailed information about the transactions among producers and other economic units. To obtain this information, the Economic Analysis Branch has constructed an input-output table for the province, which records in thousands of 1965 dollars the flow of goods and services among 140 Ontario industries in that year. The input-output technique is a powerful tool of analysis because it makes it possible to penetrate below the surface of aggregate statistics, available in the accounts, and study the complicated internal pattern of transactions between industries and other major sectors of the economy.

Secondly, the set of economic accounts is merely an historical record of economic events. It provides no explanation of the movements of economic variables or the interaction of interrelated variables in the economic system. It is the task of the econometric model to explain such phenomena. The Ontario econometric model links together the provincial economic accounts and the input-output table into an integrated and complete program of quantitative analytical techniques for policy simulation and forecasting.

The econometric model will primarily be used for three purposes. Its first use will be to provide forecast estimates of government expenditures, personal consumption, business investment and other components of final demand required for the input-output model. The second use of the model will be for making short-term forecasts of endogenous variables determined within the system on the basis of certain assumptions regarding the rate of growth of exogenous variables, which are determined outside the system. The last and perhaps most important use of the model, from the point of view of government, will be in evaluating alternative economic policies.

Policy analysis is facilitated by using a computer routine to calculate the policy or impact multipliers of the model, which measure the effects of changes in a policy variable on all dependent variables in the system. Once the policy multipliers have been computed it is possible to analyse the fiscal effects

<sup>1</sup>See R. H. Frank, S. M. Batrik and D. Haronitis, "The Input-Output Structure of the Ontario Economy", Ontario Economic Review, Vol. 8, No. 1 (January/February 1970).

<sup>2</sup>M. V. Chari and R. H. Frank, "The Development of Ontario Economic Accounts", Ontario Economic Review, Vol. 8, No. 6 (November/December 1970).



of changes in tax rates or the effects of changes in government expenditure or any desired combination of policies, eg., an increase in government expenditure combined with a simultaneous increase in taxes. By simulating the model in the computer, policy makers will be able to explore a large number of alternative policies for optimal decision-making.

3.2 The Sectors of the Ontario Model

In developing the econometric model much attention was given to the structure and conceptual framework of the provincial economic accounts. In fact, it can be said that the model was designed for the purpose of explaining significant economic variables which appear in the accounts, such as personal consumption expenditure, business investment, wages and salaries, corporate profits, the various components of government revenue, etc. An equation has been specified for each of these variables, which embodies a testable hypothesis about the causal relationship between the variable in question and some other variables.

The Ontario econometric model consists of four blocks of equations which correspond to the four sectors of provincial accounts; persons, businessmen, government and non-residents. Each sector contains a number of equations explaining various components.

The equations of the model are shown explicitly in the next Section. The symbol  $\Delta$  denotes the change of a variable in two successive periods of time, i.e., for any variable  $X_t$  at time period  $t$ ,  $\Delta X_t = X_t - X_{t-1}$ . The Greek letters  $\alpha$ ,  $\beta$  and  $\gamma$  denote parameters to be estimated.  $\alpha_i$  represents the constant term in the  $i$ th equation;  $\beta_i$  are the coefficients of endogenous variables;  $\gamma_i$  denote the coefficients of predetermined variables; and  $u_i$  is the stochastic term in the  $i$ th equation. The obvious advantage of this parameter notation is that looking at the equations one can spot at a glance which variables are endogenous and which are predetermined in the model. All equations are linear in variables and parameters. For notational convenience the time subscript  $t$  is omitted from all variables. Accordingly, current variables denoted, for example, as  $X$ ,  $Y$ ,  $Z$  should be read as  $X_t$ ,  $Y_t$ ,  $Z_t$ , and lagged variables denoted as  $(X)_{-1}$ ,  $(X)_{-2}$ ,  $(Y)_{-1}$  should be read as  $X_{t-1}$ ,  $X_{t-2}$ ,  $Y_{t-1}$  etc. The names of variables are listed in Section 3.4.

	Number of Equations
PERSONAL SECTOR	6
• Wages, salaries and supplementary labour income	
• Interest, dividends and miscellaneous investment income of persons	
• Net income of farm operators from farm production	
• Changes in farm inventories	
• Net income of non-farm unincorporated business	
• Personal expenditure on consumer goods and services	
BUSINESS SECTOR	5
• Gross private domestic investment in machinery and equipment	
• Gross private domestic investment in residential and non-residential construction	
• Changes in non-farm business inventories	
• Corporate profits and inventory valuation adjustment	
• Corporate dividend payments	
GOVERNMENT SECTOR	14
• Employer and employee contributions to social insurance and government pension funds	
• Personal income taxes	
• Taxable returns of individuals	
• Personal income assessed	
• Personal tax exemptions and deductions	
• Corporate profit taxes	
• Taxable income of corporations	
• Hospital insurance premiums	
• Motor vehicle licences and permits	
• Gasoline taxes	
• Retail sales taxes	
• Profits of liquor commissions	
• Other indirect taxes	
• Government investment income	
NON-RESIDENTS SECTOR	2
• Imports of goods and services from rest of the world	
• Exports of goods and services to rest of the world	
Number of stochastic equations	27
Number of identities	20
Total number of equations	47
Number of current endogenous variables	47
Number of predetermined variables	34
Lagged endogenous	6
Exogenous	28
Total number of variables	81
Number of $\alpha$ parameters	11
Number of $\beta$ parameters	14
Number of $\gamma$ parameters	29
Total number of parameters	54



### 3.3 Equations of the Ontario Model

#### EQUATIONS EXPLAINING COMPONENTS OF GROSS PROVINCIAL PRODUCT

Personal expenditure on consumer goods and services

$$C_p = \beta_1 Y_d + \gamma_1 (C_p)_{-1} + u_1 \quad (3-1)$$

Gross private domestic investment in machinery and equipment

$$I_m = \gamma_2 (I_m)_{-1} + \gamma_3 (P_c)_{-1} + \gamma_4 \Delta GPP + u_2 \quad (3-2)$$

Gross private domestic investment in residential and non-residential construction

$$I_c = \beta_2 I_m + \gamma_5 (M_a)_{-1} + \gamma_6 (I_c)_{-1} + u_3 \quad (3-3)$$

Change in non-farm business inventories

$$\Delta I_b = \gamma_7 (P_c)_{-1} + \gamma_8 \Delta S_f + \gamma_9 \Delta C_p + u_4 \quad (3-4)$$

Change in farm inventories

$$\Delta I_f = \alpha_5 + \gamma_{10} P_f + \gamma_{11} X_f + \gamma_{12} (I_f)_{-1} + u_5 \quad (3-5)$$

Exports of goods and services to rest of the world

$$E_w = \alpha_6 + \gamma_{13} Y_{us} + u_6 \quad (3-6)$$

Imports of goods and services from rest of the world

$$M_w = \beta_3 GPP + \gamma_{14} (C_p)_{-1} + u_7 \quad (3-7)$$

#### EQUATIONS EXPLAINING COMPONENTS OF PERSONAL INCOME

Wages, salaries and supplementary labour income

$$Y_w = \alpha_8 + \beta_4 GPP + \gamma_{15} L_p + u_8 \quad (3-8)$$

Net income of non-farm unincorporated business

$$Y_b = \alpha_9 + \gamma_{16} (GPP - \Delta I_f) + u_9 \quad (3-9)$$

Net income of farm operators from farm production

$$Y_f = \gamma_{17} \Delta X_f + \gamma_{18} P_f + u_{10} \quad (3-10)$$

Interest, dividends and miscellaneous investment income of persons

$$Y_i = \alpha_{11} + \gamma_{19} [S_p + (S_p)_{-1}] + u_{11} \quad (3-11)$$

#### EQUATIONS EXPLAINING CORPORATE PROFITS AND DIVIDENDS

Corporate profits and inventory valuation adjustment

$$P_c = \beta_5 GPP + \beta_6 \Delta I_b + u_{12} \quad (3-12)$$

Corporate dividend payments

$$D_v = \gamma_{20} (D_v)_{-1} + \gamma_{21} [P_c - (T_c + Z_x)] + u_{13} \quad (3-13)$$

#### EQUATIONS EXPLAINING COMPONENTS OF PROVINCIAL GOVERNMENT REVENUE

Employer and employee contributions to social insurance and government pension funds

$$C_s = \beta_7 Y_w + u_{14} \quad (3-14)$$

Personal income taxes

$$T_p = \beta_8 T_p^* + u_{15} \quad (3-15)$$

Personal income assessed

$$Y_a = \alpha_{16} + \gamma_{22} (Y_p)_{-1} + u_{16} \quad (3-16)$$

Personal tax exemptions and deductions

$$T_x = \beta_9 N_r + \gamma_{23} t + u_{17} \quad (3-17)$$

Taxable returns of individuals

$$N_r = \gamma_{24} (L_e)_{-1} + \gamma_{25} t + u_{18} \quad (3-18)$$

Corporate direct taxes

$$T_c = \beta_{10} T_c^* + u_{19} \quad (3-19)$$

Corporate taxable income

$$Y_c = \alpha_{20} + \gamma_{26} (P_c)_{-1} + u_{20} \quad (3-20)$$

Gasoline taxes

$$T_g = \beta_{11} T_g^* + u_{21} \quad (3-21)$$

Retail sales taxes

$$T_s = \beta_{12} T_s^* + u_{22} \quad (3-22)$$

Hospital insurance premiums

$$H_i = \beta_{13} H_i^* + u_{23} \quad (3-23)$$

Motor vehicle licences and permits

$$V_m = \alpha_{24} + \gamma_{27} V_r + u_{24} \quad (3-24)$$

Profits of liquor commissions

$$P_b = \alpha_{25} + \gamma_{28} \bar{Y}_p + u_{25} \quad (3-25)$$

Other indirect taxes

$$T_o = \alpha_{26} + \beta_{14} C_p + u_{26} \quad (3-26)$$

Government investment income

$$Y_g = \alpha_{27} + \gamma_{29} G_p + u_{27} \quad (3-27)$$

#### DEFINITIONAL IDENTITIES

Gross provincial product

$$GPP = C_p + I_m + I_c + \Delta I_b + \Delta I_f + E_w - M_w + G_p + G_m + G_h \quad (3-28)$$

Personal income

$$Y_p = Y_w + Y_b + Y_f + Y_i + Z_p + A \quad (3-29)$$

Disposable personal income

$$Y_d = Y_p - (T_p + C_s + Z_g) \quad (3-30)$$

Saving of persons and unincorporated business

$$S_p = Y_d - (C_p + Z_c) \quad (3-31)$$

Retained profits of corporations

$$S_c = P_c - (T_c + D_v + Z_x) \quad (3-32)$$



Personal income tax accruals

$$T_p^* = R_p (B_a) \quad (3-33)$$

Personal basic tax accruals

$$B_a = \sum_{i=1}^4 (W_r)_i [(Y_a)_i - (N_r)_i (\bar{T}_x)_i] - R_v (D_o) \quad (3-34)$$

Weighted average basic tax rate

$$(W_r)_i = \sum_{j=1}^n [(T_b)_{ji} / (\bar{Y}_t)_{ji}] [(Y_a)_{ji} / (Y_a)_i] \quad (3-35)$$

Personal income assessed in the first income class

$$(Y_a)_1 = Y_a - \sum_{i=2}^4 (Y_a)_i \quad (3-36)$$

Personal income assessed in the  $i$ th income class

$$(Y_a)_i = (P_y)_i (Y_a) \quad i = 2, \dots, 4 \quad (3-37)$$

Tax exemptions and deductions in the first income class

$$(T_x)_1 = T_x - \sum_{i=2}^4 (T_x)_i \quad (3-38)$$

Tax exemptions and deductions in the  $i$ th income class

$$(T_x)_i = (P_x)_i (T_x) \quad i = 2, \dots, 4 \quad (3-39)$$

Taxable returns in the first income class

$$(N_r)_1 = N_r - \sum_{i=2}^4 (N_r)_i \quad (3-40)$$

Taxable returns in the  $i$ th income class

$$(N_r)_i = (P_r)_i (N_r) \quad i = 2, \dots, 4 \quad (3-41)$$

Computed corporate direct taxes

$$T_c^* = R_c (Y_c) \quad (3-42)$$

Computed hospital insurance premiums

$$H_1^* = R_h (L_f) \quad (3-43)$$

Weighted average hospital insurance rate

$$R_h = 12 [R_{hm} (L_m/L_f) + R_{hs} (L_s/L_f)] \quad (3-44)$$

Computed gasoline taxes

$$T_g^* = R_g (F_g) + R_d (F_d) \quad (3-45)$$

Computed retail sales taxes

$$T_s^* = R_s (S_r) \quad (3-46)$$

Provincial government revenue

$$PGR = C_s + T_p + T_c + T_g + T_s + T_o + V_m + P_b + H_1 + Y_g + Z_w \quad (3-47)$$

### 3.4 List of variables

#### CURRENT ENDOGENOUS VARIABLES

$B_a$	personal basic tax accruals — Ontario taxpayers, calculated values, millions of dollars
$C_p$	personal expenditure on consumer goods and services, millions of dollars
$C_s$	employer and employee contributions to social insurance and government pension funds — provincial, millions of dollars
$D_v$	total dividend payments of Ontario corporations, millions of dollars
$\Delta I_b$	change in non-farm business inventories, millions of dollars
$\Delta I_f$	change in farm inventories, millions of dollars
$E_w$	Ontario exports of goods and services to rest of the world, millions of dollars
GPP	gross provincial product, millions of dollars
$H_1$	hospital insurance premiums as per provincial economic accounts, millions of dollars
$H_1^*$	hospital insurance premiums, calculated values, millions of dollars
$I_c$	gross private domestic investment in residential and non-residential construction, millions of dollars
$I_m$	gross private domestic investment in machinery and equipment, millions of dollars
$M_w$	Ontario imports of goods and services from rest of the world, millions of dollars
$N_r$	total number of taxable returns of individuals in Ontario, thousands of units
$(N_r)_1$	taxable returns of individuals in the first income class, number of units
$(N_r)_i$	taxable returns of individuals in the $i$ th income class, number of units
$P_c$	profits before taxes and after inventory valuation adjustment of Ontario corporations, millions of dollars
$P_b$	profits of liquor commissions, millions of dollars
PGR	total provincial government revenue, millions of dollars
$R_h$	weighted average hospital insurance annual rate, calculated values
$S_c$	retained profits of Ontario corporations, millions of dollars
$S_p$	saving of Ontario persons and unincorporated business, millions of dollars
$T_c$	corporate direct taxes — provincial, as per provincial economic accounts, millions of dollars



$T_c^*$	corporate direct taxes — provincial, calculated values, millions of dollars	PREDETERMINED VARIABLES	
$T_g$	gasoline taxes as per provincial economic accounts, millions of dollars	A	military pay and allowances, millions of dollars
	gasoline taxes, calculated values, millions of dollars	$(C_p)_{-1}$	personal expenditure on consumer goods and services, lagged one year
$T_o$	other indirect taxes as per provincial economic accounts, millions of dollars	$D_o$	dividends paid to Ontario persons by all Canadian corporations, millions of dollars
$T_p$	personal income tax collections — provincial, as per provincial economic accounts, millions of dollars	$\Delta C_p$	change in personal expenditure on consumer goods and services
$T_p^*$	personal income tax accruals — provincial, calculated values, millions of dollars	$\Delta GPP$	annual change in gross provincial product
$T_s$	retail sales taxes as per provincial accounts, millions of dollars	$\Delta S_f$	change in selling value of factory shipments, total Ontario manufacturing, millions of dollars
$T_s^*$	retail sales taxes, calculated values, millions of dollars	$\Delta X_f$	change in gross value of Ontario agricultural production, millions of dollars
$T_x$	total personal tax exemptions and deductions — Ontario taxpayers, as per <i>Taxation Statistics</i> <sup>3</sup> , millions of dollars	$F_d$	net taxable sales of diesel fuel in Ontario, thousands of gallons
$(T_x)_1$	personal tax exemptions and deductions in the first income class, thousands of dollars	$F_g$	net taxable sales of gasoline fuel in Ontario, thousands of gallons
$(T_x)_i$	personal tax exemptions and deductions in the $i$ th income class ( $i = 2, \dots, 4$ ), thousands of dollars	$G_h$	total expenditure of Ontario hospitals, millions of dollars
$V_m$	motor vehicle licences and permits — persons and business, as per provincial economic accounts, millions of dollars	$G_m$	total municipal government expenditure, millions of dollars
$(V_m)_i$	weighted average basic tax rate in the $i$ th income class, calculated values	$G_p$	total provincial government expenditure, millions of dollars
$Y_a$	total personal income assessed — Ontario taxpayers, as per <i>Taxation Statistics</i> , millions of dollars	$I_f$	level of inventories, millions of dollars
$(Y_a)_1$	personal income assessed in the first income class, millions of dollars	$L_e$	labour employed in Ontario, thousands of persons
$(Y_a)_i$	personal income assessed in the $i$ th income class ( $i = 2, \dots, 4$ ), millions of dollars	$L_f$	labour force in Ontario, thousands of persons
$Y_b$	net income of non-farm unincorporated business, millions of dollars	$L_p$	proportion of labour force employed in Ontario
$Y_c$	taxable income of Ontario corporations, millions of dollars	$L_m/L_f$	proportion of married males in the labour force, per cent
$Y_d$	personal disposable income, millions of dollars	$L_s/L_f$	proportion of single persons in the labour force, per cent
$Y_f$	net income of farm operators from farm production, millions of dollars	$(M_a)_{-1}$	number of marriages in Ontario lagged one year
$Y_g$	government investment income — provincial, millions of dollars	$NP_c$	profits before taxes of Canadian corporations
$Y_i$	interest, dividends and miscellaneous investment income of persons, millions of dollars	$(P_c)_{-1}$	corporate profits lagged one year
$Y_p$	personal income, millions of dollars	$P_f$	index of average farm prices of agricultural products in Ontario (1961 = 100)
	wages, salaries and supplementary labour income, millions of dollars	$(P_r)_i$	proportion $(N_r)_i/N_r$ of taxable returns in the $i$ th income class, per cent
		$(P_x)_i$	proportion $(T_x)_i/T_x$ of tax exemptions and deductions in the $i$ th income class, per cent
		$(P_y)_i$	proportion $(Y_a)_i/Y_a$ of personal income assessed in the $i$ th income class, per cent
		$R_c$	provincial corporate tax rate, per cent
		$R_d$	tax rate of diesel fuel per gallon

<sup>3</sup>Taxation Statistics — Analyzing the Returns of Individuals, *Department of National Revenue, Taxation, Ottawa*.



$R_g$	tax rate of gasoline fuel per gallon	$(Y_a)_{ji}$	personal income assessed in income group j, class i, millions of dollars
$R_{hm}$	monthly hospital premium for married contributors	$\bar{Y}_p$	personal income per capita
$R_{hs}$	monthly hospital premium for single persons	$(Y_p)_{-1}$	personal income lagged one year
$R_p$	provincial personal income tax rate, per cent	$(\bar{Y}_t)_{ji}$	average taxable income in the jth group of the ith income class
$R_s$	rate of retail sales tax, per cent	$Y_{us}$	gross national product of the United States, billions of U.S. dollars
$R_v$	rate of dividend tax credit, per cent	$Z_c$	transfers by persons to corporations and non-residents abroad (interest on consumer debt plus personal remittances abroad), millions of dollars
$(S_p)_{-1}$	saving of persons and unincorporated business, lagged one year	$Z_g$	transfers by persons to government (other current transfers to Ontario government plus transfers to federal government), millions of dollars
$S_r$	retail sales in Ontario, millions of dollars	$Z_p$	transfers to personal sector from all sources, millions of dollars
$t$	time trend measured in years	$Z_x$	transfers by corporations (charitable contributions and debts plus corporation income tax liabilities to federal government), millions of dollars
$(T_b)_{ji}$	basic personal tax payable on average taxable income, income group j, class i, calculated values	$Z_w$	transfers to provincial government by federal government, millions of dollars
$(\bar{T}_x)_i$	average tax exemptions and deductions in the ith income class, calculated values		
$V_r$	total number of registered motor vehicles (all types) in Ontario, thousands of units		
$X_r$	gross value of agricultural production in Ontario, millions of dollars		

### 3.5 The Consumption Function

The consumption function of the model is based on the theory developed by R. J. Ball and P. S. Drake<sup>4</sup>. This theory postulates that the utility function for a given individual depends on his current rate of consumption and his current stock of wealth or net worth, measured in terms of consumption goods.

Thus,

$$u_{it} = F_i(W_{it}, C_{it})$$

where  $u_{it}$  denotes the utility of the ith individual at time  $t$ ,  $W_{it}$  is his stock of wealth and  $C_{it}$  represents the volume of consumption goods. The function  $F_i$  is assumed to be linear and homogeneous of degree one. On this assumption, the problem for the ith individual is to maximize his utility  $u_i$  subject to the budget constraint.

$$Y_{it} = C_{it} + W_{it} - W_{it-1}$$

where  $Y_{it}$  denotes the income of the ith individual at time  $t$ .

The authors assume further that the wealth-consumption ratio for the ith individual is constant over time, so that the individual relation between wealth and consumption is of the form

$$W_{it} = k_i C_{it}$$

where the  $k_i$  are assumed to be fixed for each individual. This assumption becomes necessary if one attempts to derive an aggregate consumption function from the individual utility functions.

Aggregation of the above wealth-consumption relation gives

$$W_t = C_t \sum w_{it} k_i = k C_t$$

where

$$W_t = \sum W_{it}, C_t = \sum C_{it}, \text{ and } w_{it} = C_{it}/C_t.$$

The coefficient  $k$  can be treated as a parameter if the weights  $w_i$  are independent of time. As the authors suggest, the result of shifting from the micro to the macro relation is to introduce an aggregation bias if the macro variables are treated as simple sums of the micro variables. Aggregating the budget constraint we can write

$$Y_t = C_t + W_t - W_{t-1}$$

which combined with  $W_t = k C_t$  yields

$$C_t = \frac{1}{1+k} Y_t + \frac{k}{1+k} C_{t-1} = (1-\alpha) Y_t + \alpha C_{t-1}$$

where  $\alpha = \frac{k}{1+k}$ . This is the final version of

the Ball-Drake aggregate consumption function, and incorporates the restriction that coefficients sum to unity. This function is the same as the consumption function of the Ontario model

$$C_p = \beta_1 Y_d + \gamma_1 (C_p)_{-1} + u_1 \quad (3-1)$$

with the *a priori* restriction  $\beta_1 + \gamma_1 = 1$ . Whether this restriction is satisfied is a matter of empirical testing. If in the estimated consumption equation  $\beta_1 + \gamma_1 \neq 1$ , our consumption hypothesis can still find support in the following model developed by Klein<sup>5</sup>

$$C_t = \alpha \sum_{i=0}^{\infty} \beta^i Y_{t-i} \quad 0 < \beta < 1$$

which is a distributed lag scheme with the  $\beta$  coefficients decreasing geometrically. Extending the summation on the right-hand side we obtain

$$C_t = \alpha Y_t + \alpha \beta Y_{t-1} + \alpha \beta^2 Y_{t-2} + \dots$$

which lagged for one period, and multiplied by  $\beta$  gives

$$\beta C_{t-1} = \alpha \beta Y_{t-1} + \alpha \beta^2 Y_{t-2} + \dots$$

Finally, subtracting the second equation from the first yields

$$C_t = \alpha Y_t + \beta C_{t-1}$$

<sup>4</sup>R. J. Ball and P. S. Drake, "The Relationship Between Aggregate Consumption and Wealth", International Economic Review, Vol. 5, No. 1, (January 1964).

<sup>5</sup>L. R. Klein, "The Friedman-Becker Illusion", Journal of Political Economy, LXVI (December, 1958).



This has the same form as the Ball-Drake function without any restrictions on the parameter  $\alpha$ .

### 3.6 The Investment Functions

Reflecting the fact that a capital stock series for Ontario is not available, the investment functions of the Ontario model could not be specified on the basis of those investment theories which use capital stock as an explanatory variable. Hence, neither the capital stock adjustment principle nor the neo-classical theory of investment could be employed in formulating the investment equations of the model. Accordingly, the investment behaviour of Ontario businessmen is explained by some naive hypotheses, such as, the crude accelerator theory which postulates that investment is determined by the rate of change of output, the profit theory which states that business investment is a function of profits, and other simple models. Thus, new investment in machinery and equipment,  $I_m$ , is explained by past profits,  $(P_c)_{-1}$ , year to year changes in gross provincial product,  $\Delta GPP$ , and last year's investment,  $(I_m)_{-1}$ .

$$I_m = \gamma_2 (I_m)_{-1} + \gamma_3 (P_c)_{-1} + \gamma_4 \Delta GPP + u_2 \quad (3-2)$$

The profit variable serves both as a measure of business firms' liquidity and of expectations, whereas the income variable is an indicator of economic activity. The one year lag between the explanatory variables and the dependent variable is justified on the assumption that businessmen plan their investment expenditure one year ahead. This assumption is quite plausible in view of the fact that business firms normally base their decision on the financial statements prepared for the previous fiscal year and that the lag between investment decisions and realizations consists of the following components:

- The time that elapses between the decision to invest and the decision to order the required capital goods.
- There may be a waiting lag from the time the capital goods have been ordered until work on them begins by the capital goods industries, particularly if the industries are working near full capacity.
- The production lag, i.e., the time required by the capital goods industries to produce the goods on order.

Finally, there is a delivery lag which may involve a time interval of three or more

months in the event that the goods have to be imported from abroad.

Investment in construction is the sum of two components; investment in residential and non-residential construction. Since separate statistical data on each component are not available, one equation explains both parts of investment

$$I_c = \beta_2 I_m + \gamma_5 (M_n)_{-1} + \gamma_6 (I_c)_{-1} + u_3 \quad (3-3)$$

The explanatory variables in this equation reflect the fact that the dependent variable incorporates two different components of business investment. Thus, the first explanatory variable,  $I_m$ , was introduced to explain that part of  $I_c$  which relates to non-residential construction. The underlying hypothesis is that in a growing economy, such as Ontario, only a small part of  $I_m$  represents replacement investment, while the greater part constitutes an addition to the existing stock of machinery and equipment, which necessitates more space. Hence, when businessmen decide to invest in new machinery and equipment at the same time they make provision for additional building space required for the installation and operation of new machines.

The second explanatory variable,  $M_n$ , in equation (3-3) denoting family formation in Ontario, attempts to capture that part of  $I_c$  which corresponds to residential construction. The determinants of investment in residential construction include not only demographic variables but also other important factors, such as, income, construction costs, rents, vacancy rates, availability of mortgage funds, mortgage interest rates, etc. However, from a long-run point of view the demand for housing may be regarded as the difference between the stock of dwelling units and the number of families. Accordingly, the number of new families was chosen as the most appropriate variable in equation (3-3). The time lag between  $M_n$  and  $I_c$  ranges from zero to about three years. New couples create an immediate demand for rental accommodation in multiple dwelling units. After two or three years of marriage, when sufficient savings for a down payment have been accumulated, they enter the market as buyers of single family units. On the average, it is assumed that  $M_n$  would exert an influence on  $I_c$  with a time lag of one year. Finally,  $I_c$  is likely to be influenced by construction activity in the previous period.

Changes in non-farm business inventories,  $\Delta I_b$ , is a function of last year's profits  $(P_c)_{-1}$ ,

changes in final sales  $\Delta S_f$  and changes in personal consumption  $\Delta C_p$

$$\Delta I_b = \gamma_7 (P_c)_{-1} + \gamma_8 \Delta S_f + \gamma_9 \Delta C_p + u_4 \quad (3-4)$$

Changes in farm inventories,  $\Delta I_f$  is determined by farm output,  $X_f$ , past levels of farm inventories  $(I_p)_{-1}$ , and farm prices

$$\Delta I_f = \alpha_5 + \gamma_{10} P_f + \gamma_{11} X_f + \gamma_{12} (I_f)_{-1} + u_5 \quad (3-5)$$

Inventory investment is the most unpredictable component of aggregate demand because it fluctuates erratically over the course of a year. Empirical evidence suggests that businessmen adjust their inventories completely every quarter. For this reason, inventory models for business investment are normally estimated on the basis of quarterly rather than annual data. Since the Ontario model utilizes annual observations, it is unlikely that equation (3-4) will be satisfactory from the point of view of goodness of fit and other statistical criteria. However, equations (3-4) and (3-5), although unsatisfactory as they may be, are required for the determination of gross provincial product.

### 3.7 The Import and Export Functions

The first step in developing the foreign trade sector of the model is to determine a set of explanatory variables to be used in the import and export demand equations. Most statistical studies on imports have been based on the foreign-trade multiplier theory, which postulates that aggregate imports are a function of the level of income in a given country. Short-run fluctuations in the volume of imports are mainly attributed to fluctuations in real income, particularly in industrial countries where a rise in income is usually accompanied by a rise in imports of raw materials and food.

The extent to which a country (region) is dependent upon international trade can be measured by its average propensity to import, defined as the ratio of its national (regional) income to the value of imports of goods and services. The marginal propensity to import is the change in imports resulting from a unit change in income. The concept of the propensity to import is a generalization of Keynes' concept of the propensity to consume. Its application to international trade has certain limitations because imports will not always be related to income in the same way that consumption is related to income.



A simplified econometric model of foreign trade results from the assumption that supply and demand in the domestic market are equated by imports, i.e., imports are regarded as excess domestic demand. If domestic production of the imported commodities is negligible the import function will be identical with the consumption function for such commodities, and the propensity to import will coincide with the propensity to consume. The situation is different, however, if the imported commodity is also produced domestically, or if a close substitute for the imported good is produced at home. In this case, imports of the commodity in question will compete directly with the one produced domestically, so that imports will be affected by domestic production. But in the traditional theory of production the supply of an individual commodity is directly related to the price of that commodity and not to income. Thus, unlike consumption, imports will not be related to income alone, and the concept of import propensity will be meaningless.

From the marginal propensity to import, i.e., the coefficient of the income variable in the regression of imports on income, we can derive the income elasticity of import demand. As regards the magnitude of this elasticity, when imports are considered as marginal, Harberger<sup>6</sup> has argued that its value will be low in periods of prosperity and high in periods of depression. His argument, however, has been subjected to various criticisms, which lie beyond the scope of this study. In general, we would hesitate to reach any *a priori* conclusions about the magnitude of the income elasticity of import demand.

Besides the level of income, the demand for imports will also be affected by prices, particularly when imports are competitive with domestic production. The price variable usually employed in econometric work is a ratio of two price indexes (i.e., index of import prices/wholesale price index). Knowledge of the possible effect of changes in relative prices on the volume of imports is of great significance for policy purposes, since most short-run policy instruments, such as, tariffs, devaluation etc., operate through prices and, hence, the effectiveness of such instruments depends heavily on the price elasticity of import demand.

In view of the fact that price indexes for Ontario are non-existent, it was not possible to introduce a price variable into the import demand function. Instead, lagged personal consumption was chosen as a second explana-

tory variable in addition to the current level of GPP. Thus,

$$M_w = \beta_3 \text{GPP} + \gamma_{14} (G_p)_{-1} + u_7 \quad (3-7)$$

Export demand is determined by similar considerations. What constitutes imports of Ontario from country X is also exports of country X to Ontario and vice versa. Hence, exports abroad,  $E_w$ , are influenced by the level of income of major industrial countries trading with Ontario, i.e., the United States, the United Kingdom, the Common Market countries, Japan, etc., and relative prices (export price index/domestic price index).

$$E_w = \alpha_6 + \gamma_{13} Y_{us} + u_6 \quad (3-6)$$

As in the case of imports it was not possible to incorporate a price variable into the export equation. Data on the income of foreign countries are available from United Nations publications, but each country's income is recorded in its domestic currency. This presents the difficult problem of converting the various income series into a common denominator. To avoid this problem we chose one income variable,  $Y_{us}$ , which denotes the level of GNP in the United States in current U.S. dollars, on the grounds that the bulk of Ontario exports goes to the United States.

### 3.8 Determination of Gross Provincial Product

Gross provincial product is determined from the identity

$$\text{GPP} = C_p + I_m + I_c + \Delta I_b + \Delta I_f + E_w - M_w + G_p + G_m + G_h \quad (3-28)$$

The variables on the right-hand side are endogenously determined by equations (3-1) to (3-7) with the exception of  $G_p$ ,  $G_m$ , and  $G_h$  representing respectively expenditures of provincial government, municipal governments and hospitals, which are exogenous to the model.

### 3.9 Personal Income Equations

The income side of the provincial economic accounts contains four components of personal income which are explained by the following stochastic equations:

$$Y_w = \alpha_8 + \beta_4 \text{GPP} + \gamma_{15} L_p + u_8 \quad (3-8)$$

$$Y_b = \alpha_9 + \gamma_{16} (\text{GPP} - \Delta I_f) + u_9 \quad (3-9)$$

$$Y_f = \gamma_{17} \Delta X_f + \gamma_{18} P_f + u_{10} \quad (3-10)$$

$$Y_i = \alpha_{11} + \gamma_{19} [S_p + (S_p)_{-1}] + u_{11} \quad (3-11)$$

Wages, salaries and supplementary labour income,  $Y_w$ , of the civilian labour force is affected by the level of GPP in the current

period, and the proportion of persons employed,  $L_p$ . Military pay and allowances are not included in  $Y_w$ . Net income of non-farm unincorporated business,  $Y_b$ , is specified as a function of GPP excluding changes in farm inventories, whereas net income of farm operators from farm production,  $Y_f$ , is related to changes,  $\Delta X_f$  and the price  $P_f$ , of farm output. Interest, dividends and miscellaneous investment income of persons,  $Y_i$ , is explained in terms of present and past levels of personal saving.

Total personal income,  $Y_p$ , is the sum of  $Y_w$ ,  $Y_b$ ,  $Y_f$ ,  $Y_i$ , military pay and allowances,  $A$ , and transfer payments to persons,  $Z_p$ , from domestic and other sources.

$$Y_p = Y_w + Y_b + Y_f + Y_i + Z_p + A \quad (3-29)$$

From personal income we subtract provincial personal taxes,  $T_p$ , social insurance contributions paid to the Ontario government, plus all other transfers by persons to government,  $Z_g$ , to arrive at disposable personal income

$$Y_d = Y_p - (T_p + C_s + Z_g) \quad (3-30)$$

Finally, personal saving,  $S_p$ , is obtained as a residual from the identity

$$S_p = Y_d - (C_p + Z_c) \quad (3-31)$$

where  $Z_c$  represents transfers by persons to corporations and non-residents abroad.

### 3.10 Corporate Income Equations

To explain corporate income it is necessary to account for price movements since rising prices generate inventory profits. The price variable, however, can be eliminated if we explain corporate profits after inventory valuation adjustment. At the national level, various statistical studies have indicated that profits react strongly to changes in national income. Thus at the provincial level we postulate that corporate profits before taxes and after inventory valuation adjustment,  $P_c$ , is a function of GPP and annual changes in business inventories,  $\Delta I_b$

$$P_c = \beta_5 \text{GPP} + \beta_6 \Delta I_b + u_{12} \quad (3-12)$$

Corporate dividend payments,  $D_v$ , is related to past dividends and net profits.

$$D_v = \gamma_{20} (D_v)_{-1} + \gamma_{21} [P_c - (T_c + Z_x)] + u_{13} \quad (3-13)$$

where  $T_c$  and  $Z_x$  denote respectively provincial and federal corporate taxes.

<sup>6</sup>A. C. Harberger, "A Structural Approach to the Problem of Import Demand", American Economic Review, XLIII (May, 1953), p. 157.



Retained profits of corporations is derived as a residual deducting dividends and taxes from gross profits.

$$S_c = P_c - (T_c + D_v + Z_x) \quad (3-32)$$

### 11 The Personal Income Tax Sub-Model

The tax equations of an econometric model can be specified in two different ways. The simplest approach is to ignore the complications of the tax structure and to regress tax receipts, as recorded in the economic accounts, on a set of explanatory variables which serve as proxies for the relevant tax base. Although tax receipts equations may perform well in short-term forecasting when tax rates remain unchanged, they are quite useless if we wish to analyze the implications of alternative tax policies. However, because of its simplicity, this approach has been used in a number of empirical studies as, for example, in the models of Ohio and Nova Scotia reviewed in the previous Chapter<sup>7</sup>.

The alternative approach is to take account of the complexities of the tax structure and to specify the tax equations in a way that permits the introduction of tax rates. The basic methodology of this approach involves the reconciliation of two different sets of tax estimates; the tax data available in the economic accounts with those available in *Taxation Statistics*.

In developing the tax equations of the Ontario model we chose the second alternative because despite its complexities it has the advantage of providing answers to important tax policy questions, by allowing the evaluation of the fiscal effects of changes in tax rates. The specification of tax equations is based on the methodology outlined in a recent study by the Bank of Canada Research Staff<sup>8</sup>, with certain modifications and adaptations required to preserve consistency in the overall model.

Provincial income taxes are collected by the federal government on behalf of the province under the Federal-Provincial Tax-Sharing Agreements of 1962. The Ontario personal tax is calculated as a percentage of the "basic tax" which represents the total federal income tax on the taxable income earned by persons resident on the 31st December in the province, plus any tax adjustments and less dividend tax credit. The rates were 16 per cent for the 1962 taxation year, 17 per cent for 1963, 18 per cent for 1964, 19 per cent for 1965, 24 per cent for 1966 and 28 per cent for 1967 and 1968.

We begin the description of the income tax sub-model with the classification of Ontario taxpayers into four income classes, each class containing a number of income groups as follows:

Table 3-1 – Classification of Ontario Taxpayers According to Assessed Personal Income

Income Groups	Income Classes			
	Class 1	Class 2	Class 3	Class 4
Group 1	0-1,999	3,000-3,999	5,000-5,999	10,000-14,999
Group 2	2,000-2,999	4,000-4,999	6,000-6,999	15,000-19,999
Group 3			7,000-7,999	20,000-24,999
Group 4			8,000-8,999	25,000-over
Group 5			9,000-9,999	
Class Range	0-2,999	3,000-4,999	5,000-9,999	10,000-over

By utilizing the information available in *Taxation Statistics* we compute first a weighted average basic tax rate  $(W_r)_i$  for each income class using the identity

$$(W_r)_i = \sum_{j=1}^n [(T_b)_{ji}/(\bar{Y}_t)_{ji}] [(Y_a)_{ji}/(Y_a)_i] \quad (3-35)$$

where  $i = 1, \dots, 4$  corresponds to the  $i$ th income class and  $j = 1, \dots, n$  ( $n \leq 5$ ) corresponds to the  $j$ th income group, i.e.,  $(Y_a)_{ji}$  denotes personal income assessed by taxpayers in the  $j$ th income group of the  $i$ th income class.

The next step is to compute personal basic tax accruals,  $B_a$ , from the relation

$$B_a = \sum_{i=1}^4 (W_r)_i [(Y_a)_i - (N_r)_i (\bar{T}_x)_i] - R_v (D_o) \quad (3-34)$$

Multiplying  $B_a$  by the Ontario personal income tax rate,  $R_p$ , we obtain personal income tax accruals,  $T_p^*$  from the identity

$$T_p^* = R_p (B_a) \quad (3-33)$$

In the final step we reconcile personal income tax accruals, derived from taxation statistics, with personal income tax collections,  $T_p$ , obtained from the provincial economic accounts, using the stochastic equation

$$T_p = \beta_8 T_p^* + u_{15} \quad \beta_8 > 1 \quad (3-15)$$

Ideally, the two tax series representing collections,  $T_p$ , and accruals,  $T_p^*$ , should be identical, in which case the estimated value of the coefficient  $\beta_8$  should be equal to unity.

In actual fact, however, tax accruals based on taxation statistics are likely to be underestimated in relation to tax collections based on provincial accounts for two reasons. First, taxation data are derived from a sample

covering approximately six per cent of total tax returns. The sample excludes armed forces and the data fail to take into account tax adjustments. Secondly, a portion of income is not reported on tax returns. Hence, in general  $T_p > T_p^*$  and we must impose the *a priori* restriction  $\beta_8 > 1$  on the coefficient of  $T_p^*$ .

The statistical relationship (3-15) and the identities (3-33), (3-34) and (3-35) are sufficient for explaining the income tax structure prevailing in the past. The usefulness of the personal income tax sub-model can, however, be enhanced by specifying some additional equations which facilitate forecasting and policy analysis. In particular, we require that at least three variables be determined stochastically – the number of taxable returns, assessed personal income and personal tax exemptions and deductions – in view of the fact that there is normally a publication lag of two years in *Taxation Statistics*.

The total number of taxable returns of individuals,  $N_r$ , is determined by a time trend and the number of persons employed in the previous period. This formulation makes it easy to forecast  $N_r$  in the next period.<sup>9</sup>

$$N_r = \gamma_{24} (L_e)_{-1} + \gamma_{25} t + u_{18} \quad (3-18)$$

Knowing  $N_r$  we can estimate  $(N_r)_i$ , the number of taxable returns in the second, third and fourth income class from the identities

$$(N_r)_i = (P_r)_i N_r \quad i = 2, \dots, 4 \quad (3-41)$$

<sup>7</sup>The Ohio model (see page 8) contains one tax equation (2-39) which explains retail sales tax receipts in terms of retail sales. The Nova Scotia model (see page 11) has three tax

equations, (2-70), (2-74) and (2-75) explaining respectively, total personal income taxes, corporate profit taxes and total indirect taxes.

<sup>8</sup>See John F. Helliwell et. al., Government Sector Equations for Macroeconomic Models, Bank of Canada, Staff Research Studies, No. 4, 1969.



Finally, the number of returns in the first income class is obtained as a residual

$$(N_r)_1 = N_r - \sum_{i=2}^4 (N_r)_i \quad (3-40)$$

Similarly, total income assessed in year  $t$  is a function of personal income earned in year  $t-1$ .<sup>10</sup>

$$Y_a = \alpha_{16} + \gamma_{22} (Y_p)_{-1} + u_{16} \quad (3-16)$$

Personal income assessed in the  $i$ th income class is obtained using the identities

$$(Y_a)_i = (P_y)_i Y_a \quad i = 2, \dots, 4 \quad (3-37)$$

except the income assessed in the first income class which is derived as a residual

$$(Y_a)_1 = Y_a - \sum_{i=2}^4 (Y_a)_i \quad (3-36)$$

Total tax exemptions and deductions,  $T_x$ , is related to tax returns and a time variable

$$T_x = \beta_9 N_r + \gamma_{23} t + u_{17} \quad (3-17)$$

Tax exemptions and deductions in the  $i$ th income class is derived from

$$(T_x)_i = (P_x)_i T_x \quad i = 2, \dots, 4 \quad (3-39)$$

and

$$(T_x)_1 = T_x - \sum_{i=2}^4 (T_x)_i \quad (3-38)$$

The proportions  $(P_r)_i$ ,  $(P_y)_i$  and  $(P_x)_i$  are computed from (3-41), (3-37) and (3-39) respectively, utilizing taxations statistics. The calculated values suggest that these proportions have exhibited a systematic movement over the period 1962-68 and, hence, they can be easily forecast beyond the observation period by extrapolation or other methods.

### 3.12 Corporate Profit Taxes

Since 1957, when the Federal-Provincial Tax Sharing Arrangements Act came into effect, Ontario levies and collects its own tax on corporation profits. The provincial corporate income tax rate was 11 per cent during the period 1957-1966, of which 9 per cent constituted an abatement of federal tax and 2 per cent a surcharge over and above the abatement. From 1967 the federal abatement was increased to 10 per cent bringing the provincial rate up to 12 per cent. Prior to 1957 Ontario had rented for some years its corporation tax field to the federal government. Due to these institutional changes in the administration of the tax, the corporate tax equations of the model attempt to explain the corporate tax structure in Ontario after the year 1957.

Utilizing the information available in *Taxation Statistics* we first construct a series for corporation taxable income,  $Y_c$ , on which we apply the corporate tax rate,  $R_c$ , to derive the computed values of corporate profit taxes

$$T_c^* = R_c (Y_c) \quad (3-42)$$

The series  $T_c^*$  is then reconciled with corporate profit tax accruals,  $T_c$ , as they appear in the provincial economic accounts, according to the stochastic relationship

$$T_c = \beta_{10} T_c^* + u_{19} \quad (3-19)$$

For policy analysis and forecasting purposes  $Y_c$  must be obtained endogenously and, hence, we need one more stochastic equation

$$Y_c = \alpha_{20} + \gamma_{26} (P_c)_{-1} + u_{20} \quad (3-20)$$

The operation of the corporate tax sub-model can be described as follows: Given  $P_c$  in the current period,  $t$ , we derive from (3-20) a forecast value for  $Y_c$  in period  $t+1$ , which substituted into (3-42) yields  $T_c^*$  in year  $t+1$ . Finally, using (3-19) we obtain a forecast for  $T_c$  one period ahead. Similarly, knowing  $P_c$  in year  $t+1$  we can predict  $T_c$  in year  $t+2$  etc.<sup>11</sup> It is also possible to study the effects of changes in the tax rate,  $R_c$ , on government revenue and other variables in the model.

### 3.13 Gasoline Tax

The basis of the gasoline tax is the net taxable sales of gasoline fuel,  $F_g$ , and the net taxable sales of diesel fuel,  $F_d$ , measured in gallons. The tax rates are expressed in cents per gallon, for example, the rate for gasoline,  $R_g$ , was 18 cents per gallon in 1968, and the rate for diesel,  $R_d$ , was 24 cents per gallon in the same year. Data on fuel sales and tax rates are readily available from DBS publications. Using this information we can obtain computed values of gasoline taxes as follows:

$$T_g^* = R_g (F_g) + R_d (F_d) \quad (3-45)$$

Gasoline tax collections,  $T_g$ , as they appear in the provincial accounts is then related stochastically to  $T_g^*$

$$T_g = \beta_{11} T_g^* + u_{21} \quad (3-21)$$

The variables  $F_g$  and  $F_d$  display a systematic trend over the years and can be easily forecast using a time trend.

### 3.14 Retail Sales Tax

The retail sales tax was first imposed in Ontario in 1961. The rate of sales tax was 3 per cent from 1961 to 1965 and 5 per cent there-

after. This rate applies on all retail sales with the exception of food products, drugs, school books and some other items. As in the previous case of the gasoline tax, we specify two equations for the retail sales tax, one stochastic and one identity.

$$T_s = \beta_{12} T_s^* + u_{22} \quad \beta_{12} < 1 \quad (3-22)$$

$$T_s^* = R_s (S_r) \quad (3-46)$$

The identity helps to determine a series of computed values of sales taxes,  $T_s^*$ , by applying the tax rate,  $R_s$ , on total retail sales,  $S_r$ . Since no adjustment was made to exclude from  $S_r$  retail sales not subject to tax, the computed tax accruals,  $T_s^*$ , appear to be greater than the actual tax collections,  $T_s$ , as recorded in the provincial accounts and, therefore, the estimated coefficient  $\beta_{12}$  is expected to be less than one.

### 3.15 Hospital Insurance Premiums

The basis for explaining hospital insurance premiums is the civilian labour force,  $L_f$ , since all persons employed are socially insured through payroll deductions. The monthly premium paid in Ontario by married contributors,  $R_{hm}$ , is twice as much as the monthly rate paid by single persons,  $R_{hs}$ , including those divorced and widowed. The single monthly rate was \$2.10 between 1961 and 1963, \$3.25 from 1964 to June 1968 and \$5.50 from July 1968. From 1961 census data we compute the ratios  $L_m/L_f$  and  $L_s/L_f$ , representing respectively the proportion of married males and single persons in the labour force, which we assume to apply for other years. Using this information we calculate a weighted average premium rate

$$R_h = 12 [R_{hm} (L_m/L_f) + R_{hs} (L_s/L_f)] \quad (3-44)$$

which we apply on the labour force to obtain a computed series for hospital insurance premiums

$$H_i^* = R_h (L_f) \quad (3-43)$$

This series is related stochastically to the hospital premiums series  $H_i$  as it appears in the provincial accounts.

$$H_i = \beta_{13} H_i^* + u_{23} \quad (3-23)$$

### 3.16 Motor Vehicle Licences and Permits

The licence fee for motor vehicles in Ontario is uniform regardless of whether a vehicle is used for personal or business purposes. Accordingly, the dependent variable  $V_m$  explains total fees for motor vehicle licences and

<sup>9</sup>Strictly speaking,  $N_r$  in the year  $t$  will depend on  $L_e$  in the same year. However, the inclusion of current  $L_e$  in equation (3-18) imposes the difficult problem of forecasting employment, which for lack of data, we have been unable to explain endogenously in the model.

<sup>10</sup>A more appropriate specification of equation (3-16) is to use current  $Y_p$  as an explanatory variable. In such a case, forecast values of  $Y_a$  can only be obtained by forecasting  $Y_p$ , which entails the simultaneous solution of eleven equations comprising the GPP and personal

income blocks of the model.

<sup>11</sup>Equation (3-20) can also be specified in terms of current profits, in which case we must forecast  $P_c$  prior to forecasting  $Y_c$ . This requires the simultaneous solution of eight equations explaining profits and the GPP components.



Table 3-2 — Matrix of Endogenous Variables

Equation No.	$I_m$	$\Delta I_b$	$\Delta I_f$	$E_w$	$Y_b$	$Y_f$	$Y_i$	$D_v$	$T_p$	$T_c$	$T_g$	$T_s$	$H_i$	$V_1$	$P_1$	$Y_g$	$I_c$	$M_w$	$C_p$	GPP	$Y_w$	$P_c$	$C_s$	$T_o$	$Y_p$	$Y_d$	$S_p$	$S_c$	PGR
3-4	x																												
3-5		x																											
3-6			x																										
3-9				x																									
3-10					x																								
3-11						x																							
3-13							x																						
3-15								x																					
3-19									x																				
3-21										x																			
3-22											x																		
3-23												x																	
3-24													x																
3-25														x															
3-27															x														
3-7	x																x												
3-1																		x											
3-28	x	x	x	x													x	x	x	x									
3-8																				x	x								
3-12		x																		x		x							
3-14																					x		x						
3-26																			x					x					
3-30					x	x	x			x											x				x				
3-31																			x						x		x		
3-32								x		x												x							x
3-47									x	x	x	x	x	x	x	x							x	x					x

permits paid by both persons and business. The basis of the fee is the number of cylinders and the year of the vehicle. Effective December 1, 1968, the rates for models after 1933 are as follows: \$20.00 for 4 cylinders or less, \$27.50 for 6 cylinders and \$35.00 for 8 cylinders or more. Since data on car registrations by cylinder are not available it is not possible to compute a weighted average licence fee per registered motor vehicle. Thus,  $V_m$  is simply correlated with  $V_r$  denoting the total number of registered motor vehicles (all types) in Ontario.

$$V_m = \alpha_{24} + \gamma_{27} V_r + u_{24} \quad (3-24)$$

### 3.17 Profits of Liquor Commissions

Revenue from profits of liquor commissions,  $P_b$ , is related to per capita personal income,

$$P_b = \alpha_{25} + \gamma_{28} \bar{Y}_p + u_{25} \quad (3-25)$$

### 3.18 Other Components of Government Revenue

The remaining components of government revenue are various indirect taxes, investment income and transfer payments. Other indirect taxes not explained individually in the model include the following:

- Amusement taxes
- Corporation taxes (not on profits)
- Other licences, fees and permits
- Miscellaneous taxes on natural resources
- Real property taxes
- Miscellaneous

The sum of all these items, denoted by  $T_o$ , is regressed on personal consumption expenditure

$$T_o = \alpha_{26} + \beta_{14} C_p + u_{26} \quad (3-26)$$

Government investment income (interest and royalties) is linearly related to total government expenditure

$$Y_g = \alpha_{27} + \gamma_{29} G_p + u_{27} \quad (3-27)$$

Transfer payments from federal and local governments are exogenous to the model. Finally, employer and employee contributions to social insurance,  $C_s$ , is a function of wages and salaries,  $Y_w$ , in equation (3-14).

Total provincial government revenue is the sum of all revenue components as follows:

$$PGR = C_s + T_p + T_c + T_g + T_s + T_o + V_m + P_b + H_i + Y_g + Z_w \quad (3-47)$$

### 3.19 Interdependency and Recursiveness in the Ontario Model

Having specified the Ontario econometric model in equations (3-1) to (3-47) the



question arises whether the model is recursive or interdependent. To answer this question we take the following steps. First, to facilitate the exposition, we eliminate four stochastic equations, (3-16), (3-17), (3-18) and (3-20) which are not essential to the model as far as its interdependent character is concerned. We also eliminate most of the identities retaining only (3-28) to (3-32) inclusive and (3-47). The resulting system consists of a total of 29 equations of which 23 are stochastic and 6 are identities. The second step involves the rearrangement of equations and variables in an attempt to produce, as far as possible, a triangular matrix of

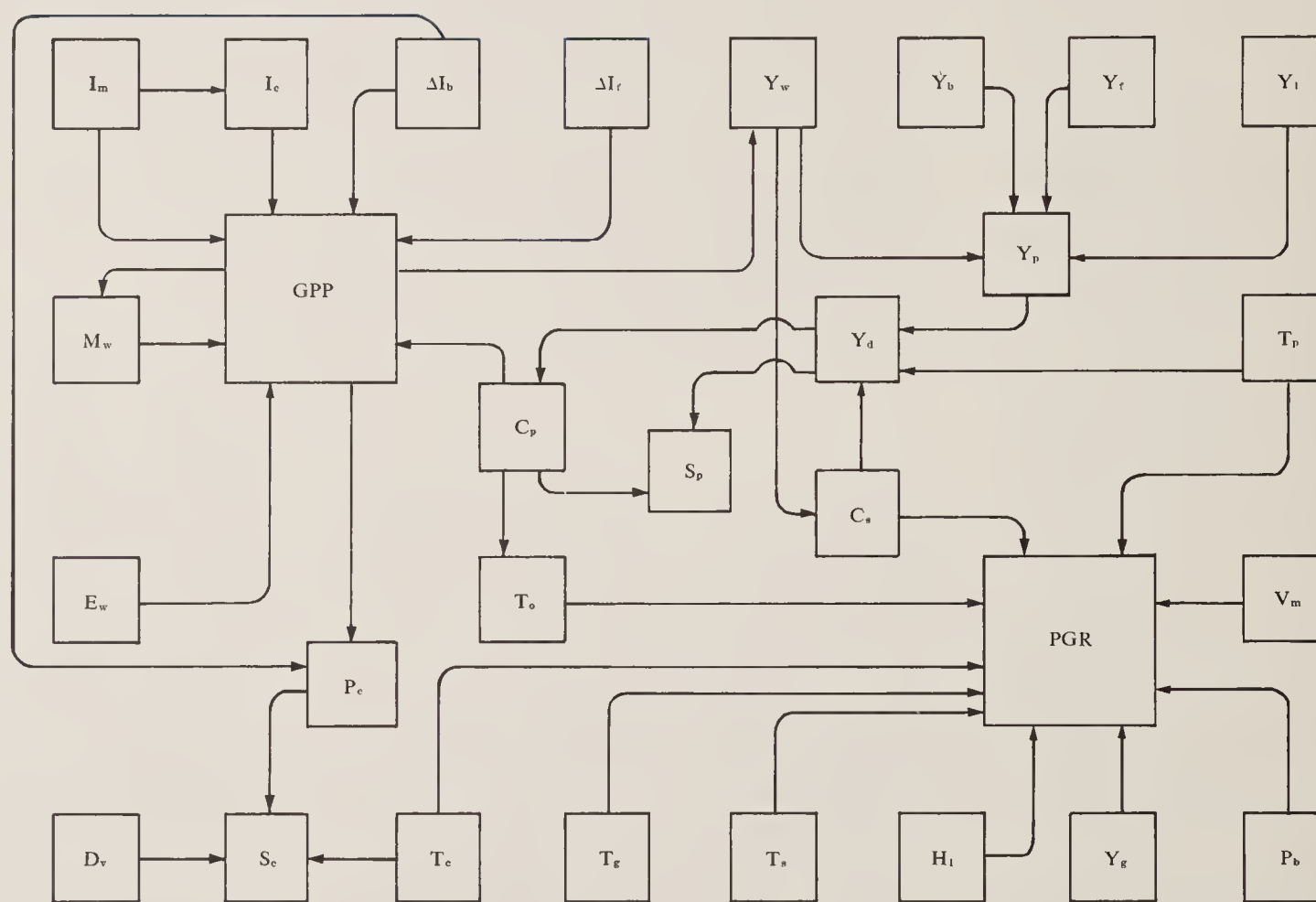
coefficients of the endogenous variables, as shown in Table 3-2.

In this Table, empty cells designate zero coefficients, whereas occupied cells designate non-zero coefficients in the matrix. Thus if the  $ij$ th cell contains an entry  $x$  it means that the  $j$ th variable appears in the  $i$ th equation with a non-zero coefficient. Conversely, if the  $ij$ th cell is empty it means that the  $j$ th variable does not appear in the  $i$ th equation. The rows of the matrix indicate which endogenous variables appear in each equation, i.e., equation (3-29) contains the variables  $Y_b$ ,  $Y_f$ ,  $Y_i$ ,  $Y_w$  and  $Y_p$ . The columns of the matrix indicate which equations contain each endo-

genous variable, i.e., the variable  $C_p$  appears in equations (3-1), (3-26), (3-28) and (3-31).

It is evident from Table 3-2 that the Ontario model is interdependent, since there exist non-zero coefficients of endogenous variables above the main diagonal of the matrix, that is, the matrix is not triangular. The non-recursive character of the model results from the presence of two equations, namely, the import function (3-7) which establishes a direct and mutual interdependency between  $M_w$  and GPP, and the consumption function (3-1) which specifies an indirect interdependency between  $C_p$  and  $S_p$  via  $Y_d$ .

### Causal Ordering of the Endogenous Variables



The interdependent character of the Ontario model can also be presented in graphical form, as in the above diagram which shows the causal ordering of the endogenous variables. Current endogenous variables are denoted by squares of equal size with the exception of two variables of major importance, which are represented by larger squares — gross provincial product (GPP) and provincial government revenue (PGR). Each arrow in this diagram indicates a causal relationship between two variables. The variable from which an arrow begins is the direct

cause of the variable at which the arrow ends. For example,

$$GPP \rightarrow P_c \rightarrow S_c$$

indicates that GPP is the direct cause of  $P_c$  and  $P_c$  of  $S_c$ . As shown by the arrow scheme in the diagram the model is interdependent because two of the relationships are not unilateral. There is a two-way causation between GPP and  $M_w$ , since these variables are connected by two arrows, and also indirectly between  $C_p$  and  $Y_d$  where the arrows cross.

This interdependent model can be con-

verted to a recursive one by re-specifying the consumption function (3-1) and the import equation (3-7). If we postulate, for example, that  $C_p$  is related to past levels of consumption and disposable income we can write  $C_p = \gamma_{30} (Y_d)_{-1} + \gamma_1 (C_p)_{-1} + u_i$  (3-48). Similarly, assuming that imports are related to past levels of GPP we have

$$M_w = \gamma_{31} (GPP)_{-1} + u_7 \quad (3-49)$$

If we replace equations (3-1) and (3-7) by (3-48) and (3-49) respectively the model becomes fully recursive.



### 3.20 Identification of the Interdependent Model

Before we attempt to estimate the model it is necessary to investigate whether unique values can be obtained for the structural parameters, that is, whether the stochastic equations of the model are identifiable. The problem of identification is, therefore, logically prior to the problem of estimation.

The nature of the identification problem in econometric models can be discussed in the light of a simple example. Consider a naive model in which the supply and demand for commodity X in a competitive market are related to price

$$D_t = \alpha_0 + \alpha_1 P_t + u_t$$

$$S_t = \beta_0 + \beta_1 P_t + v_t$$

$$D_t = S_t$$

where  $D_t$  and  $S_t$  denote respectively the quantity of X demanded and supplied at time  $t$ ,  $P_t$  is the market clearing price and  $u_t$  and  $v_t$  random disturbances. Suppose that two independent investigators are analysing the market for commodity X using data on quantity and price. Investigator A fits the demand equation and asserts that he has estimated the demand curve, whereas investigator B fits the supply equation and postulates that he has estimated the supply curve. Since, however, the two investigators fitted a regression equation of the same statistical form, utilizing the same information, the results must necessarily be the same. The question arises how can we decide whether it is the supply or the demand curve. This is the problem of identification.<sup>12</sup>

In the above model neither the demand nor the supply equation is identified because both equations have the same statistical form, that is, they contain exactly the same variables. We can state, therefore, that a model is identified if each of the structural equations has a unique statistical form. This condition is satisfied if linear combinations of the other equations in the model cannot produce an equation, different from the one in question, containing exactly the same variables. It follows from this definition that recursive models are, in general, identified because they possess the property that the matrix of coefficients of the endogenous variables is triangular, which ensures that each of the equations has a unique statistical form. In interdependent models, on the other hand, where no restriction is imposed on the form of the coefficient matrix, it is necessary to investigate the identifiability of each and every equation.

There are two criteria for determining the identifiability of the structural equations in linear models.

- The order condition of identifiability
- The rank condition of identifiability

The order condition states that a structural equation within a model is identified if the number of predetermined variables excluded from that equation is at least equal to the number of endogenous variables included less one. Suppose, for example, that we wish to investigate the identifiability of the  $i$ th equation in a model consisting of  $G$  equations in  $G$  endogenous and  $K$  predetermined variables. Let  $G\Delta$  and  $K_x$  denote the number of endogenous and predetermined variables respectively included in the  $i$ th equation, and  $G\Delta\Delta$  and  $K_{xx}$  the number of endogenous and predetermined variables excluded from the  $i$ th equation. Applying the order condition we have three possibilities.

If  $K_{xx} < G\Delta - 1$

the  $i$ th equation is said to be under-identified.

If  $K_{xx} = G\Delta - 1$

the  $i$ th equation is exactly identified.

Finally, if  $K_{xx} > G\Delta - 1$

the  $i$ th equation is over-identified.

Various estimation methods can be applied to exactly and over-identified equations. On the other hand, under-identified equations cannot be estimated statistically. If such equations exist in a model they must be properly re-specified in a way that makes them identifiable.

The order criterion is merely a counting rule and its application is simple and straightforward. The disadvantage of the order condition is that it is necessary but not sufficient. The rank condition is both necessary and sufficient but its application is rather complicated because it involves the computation of the rank of a sub-matrix of coefficients properly arranged as follows: First, we arrange the coefficients of the endogenous variables in a matrix form, as we did in Table 3-2, which we call the B matrix of coefficients. In the same way we arrange the coefficients of the predetermined variables. The resulting matrix is called the  $\Gamma$  matrix of coefficients. The next step is to define a new matrix A which contains both the B and the  $\Gamma$  matrices.

$$A = [B\Gamma]$$

From the matrix A we select the sub-matrix  $A\Delta\Delta_{xx}$  having  $G\Delta$  rows and  $K_{xx}$  columns.

The rank condition states that the  $i$ th structural equation is identified if the rank,  $\rho$ , of  $A\Delta\Delta_{xx}$  is equal to the number of equations less one, that is

$$\rho(A\Delta\Delta_{xx}) = G - 1.$$

In practice the computation of the rank of sub-matrices from A is quite involved and can be only performed by a computer. And since the computer input must consist of numbers rather than letters, such as,  $b_{ij}$  and  $\gamma_{ij}$  which denote coefficients, it follows that the rank condition can be applied only after values have been obtained for the structural or the reduced-form parameters<sup>13</sup>. The order criterion although not sufficient can be used prior to estimation for investigating the identifiability of the structural equations in a model.

The order condition was applied to the Ontario interdependent model. The result was that all equations in the model were found to be over-identified.

## IV ESTIMATION OF THE ONTARIO ECONOMETRIC MODEL

### 4.1 Statistical Data Sources

The statistical series utilized to estimate the parameters of the Ontario econometric model were taken, for the most part, from the Ontario economic accounts compiled by the Economic Analysis Branch. A limited number of variables representing components of personal income and taxation data were available in publications of the Dominion Bureau of Statistics and the Department of National Revenue.

The Economic Analysis Branch has initiated the development of two alternative sets of income and expenditure estimates for the province of Ontario, one based on the "national" concept<sup>1</sup> and the other on the "domestic" concept. A detailed description and comparative analysis of these two sets of estimates is scheduled for publication in the *Ontario Economic Review*. For the purpose of estimating the parameters of the model the time series based on the "domestic" concept were used.

Most of the equations were estimated on the basis of 21 annual observations, however, in some cases only a shorter time period could be used. For example, equation (3-22), which explains sales taxes, was fitted to the period 1961-68 since the sales tax was first imposed in Ontario in 1961.

<sup>12</sup>See Daniel B. Suits, *The Theory and Application of Econometric Models*. Centre of Economic Research, Training Seminar Series, No. 3, Athens 1963, p. 117.

<sup>13</sup>The rank condition can be stated either in

terms of the structural coefficients, as above, or in terms of the reduced-form coefficients of the model. See J. Johnston, *Econometric Methods*, McGraw-Hill Book Company, Inc. New York 1963, p. 252.

<sup>1</sup>See M. V. Chari and R. H. Frank, "The Development of Ontario Economic Accounts", *Ontario Economic Review*, Vol. 8, No. 6, Nov/Dec 1970.



All monetary variables are expressed in current dollars, since price deflators relating to the province as a whole are not available.

## 4.2 Methods of Parameter Estimation

The structural parameters of the model were estimated by using two statistical methods; Ordinary Least-Squares (OLS) and Two-Stage Least-Squares (TSLS). As shown in Appendix B, the OLS method when applied to a system of mutually interdependent relationships yields biased and inconsistent estimates of the parameters. The TSLS method, on the other hand, gives consistent estimators, as discussed in Appendix C. Our estimation procedure involved the combined use of both methods.

During the experimentation stage, the OLS method was used to test alternative hypotheses about economic behaviour. Once the final choice of the best equations was made, on the basis of statistical and other criteria, the TSLS method was employed to re-estimate the parameters in equations which included current endogenous variables on the right-hand side. Although this constitutes a standard procedure in applied econometrics, some authors<sup>2</sup> have suggested that in testing

alternative specifications in simultaneous-equation systems it is more appropriate to use the simultaneous-equation TSLS method and not the single-equation OLS method because each relationship should not be judged individually but in terms of the complete model. It must be remembered, however, that the asymptotic property of consistency gained with TSLS presupposes very large samples and provides cold comfort to econometricians working typically with twenty or so observations.

The classical TSLS method as developed in Appendix C requires in the first stage that each of the endogenous variables be regressed on the complete set of all predetermined variables. In practice, however, this is not always feasible because the number of predetermined variables may exceed the number of observations, in which case it is necessary to select a suitable number of variables to be included in the regressions.

The Ontario model contains about 34 predetermined variables whereas the sample size consists of only 21 observations. Thus, about half of the variables had to be ignored during the first stage of the TSLS procedure. The

selection of variables was based on the contribution of alternative subsets of predetermined variables on the explanation of the dependent variables, as measured by the corrected coefficient of multiple determination<sup>3</sup>. The predetermined variables used in the first stage regressions were the following:

$(C_p)_{-1}$ ,  $(I_m)_{-1}$ ,  $(P_c)_{-1}$ ,  $(M_a)_{-1}$ ,  $(I_c)_{-1}$ ,  $\Delta S_f$ ,  $X_f$ ,  $(I_f)_{-1}$ ,  $Y_{us}$ ,  $L_p$ ,  $G_p$ ,  $S_p + (S_p)_{-1}$ ,  $P_f$ ,  $\Delta X_f$  and  $(GPP - \Delta I_f)$

## 4.3 The Estimated Equations

The estimated parameters of the Ontario model are presented in this Section. Equations (4-1) to (4-27) are those estimated by OLS and have been selected among various specifications which will be discussed in later Sections of this study. Equations (4-28) to (4-34) have been estimated by the TSLS method. For each equation the numbers in parentheses beneath the coefficients denote standard errors,  $\bar{R}^2$  is the coefficient of multiple determination adjusted for degrees of freedom, DW represents the Durbin-Watson d statistic and VN is the von-Neumann ratio. The period of fit is also given for each individual relationship.

### EQUATIONS ESTIMATED BY OLS

$$C_p = 0.60864 Y_d + 0.36328 (C_p)_{-1} \quad (4-1)$$

(0.08397) (0.09815)

$$1948-68 \quad \bar{R}^2 = 0.9999 \quad DW = 0.4082 \quad VN = 0.4286$$

$$I_m = 0.37928 (I_m)_{-1} + 0.28847 (P_c)_{-1} + 0.17582 \Delta GPP \quad (4-2)$$

(0.10094) (0.06452) (0.03287)

$$1948-68 \quad \bar{R}^2 = 0.9967 \quad DW = 1.8998 \quad VN = 1.9948$$

$$I_c = 0.42143 I_m + 0.00194 (M_a)_{-1} + 0.68579 (I_c)_{-1} \quad (4-3)$$

(0.09768) (0.00151) (0.09104)

$$1948-68 \quad \bar{R}^2 = 0.9958 \quad DW = 1.9273 \quad VN = 2.0237$$

$$\Delta I_b = 0.05399 (P_c)_{-1} + 0.17769 \Delta S_f - 0.08214 \Delta C_p \quad (4-4)$$

(0.05743) (0.05787) (0.16971)

$$1948-68 \quad \bar{R}^2 = 0.7426 \quad DW = 2.5645 \quad VN = 2.6930$$

$$\Delta I_f = 984.844 - 9.44460 P_f + 0.56931 X_f - 0.65386 (I_f)_{-1} \quad (4-5)$$

(446.755) (5.72596) (0.32168) (0.21038)

$$1948-68 \quad \bar{R}^2 = 0.2564 \quad DW = 1.9100 \quad VN = 2.0055$$

$$E_w = -197.765 + 15.4291 Y_{us} \quad (4-6)$$

(74.1155) (1.69192)

$$1948-68 \quad \bar{R}^2 = 0.8042 \quad DW = 2.1883 \quad VN = 2.2977$$

$$M_w = 0.20248 GPP + 0.06717 (C_p)_{-1} \quad (4-7)$$

(0.00683) (0.01193)

$$1948-68 \quad \bar{R}^2 = 0.9999 \quad DW = 1.7437 \quad VN = 1.8309$$

$$Y_w = 5008.00 + 0.57687 GPP - 56.2500 L_p \quad (4-8)$$

(1848.73) (0.00350) (18.9715)

$$1948-68 \quad \bar{R}^2 = 0.9993 \quad DW = 1.3061 \quad VN = 1.3715$$

$$Y_b = 114.901 + 0.04263 (GPP - \Delta I_f) \quad (4-9)$$

(22.3920) (0.00459)

$$1948-68 \quad \bar{R}^2 = 0.8100 \quad DW = 2.0130 \quad VN = 2.1136$$

$$Y_f = 0.28207 \Delta X_f + 2.91652 P_f \quad (4-10)$$

(0.13133) (0.08833)

$$1948-68 \quad \bar{R}^2 = 0.9881 \quad DW = 0.4306 \quad VN = 0.4521$$

$$Y_i = 37.2239 + 0.60846 [S_p + (S_p)_{-1}] \quad (4-11)$$

(16.7488) (0.03218)

$$1949-68 \quad \bar{R}^2 = 0.9494 \quad DW = 1.2861 \quad VN = 1.3538$$

$$P_c = 0.11420 GPP + 0.41328 \Delta I_b \quad (4-12)$$

(0.00267) (0.17774)

$$1948-68 \quad \bar{R}^2 = 0.9962 \quad DW = 1.4761 \quad VN = 1.5499$$

$$D_v = 0.54416 (D_v)_{-1} + 0.21138 [P_c - (T_c + Z_x)] \quad (4-13)$$

(0.11043) (0.04428)

$$1957-68 \quad \bar{R}^2 = 0.9991 \quad DW = 1.9837 \quad VN = 2.1641$$

$$C_s = 0.00814 Y_w \quad (4-14)$$

(0.00013)

$$1948-68 \quad \bar{R}^2 = 0.9948 \quad DW = 1.6262 \quad VN = 1.7075$$

<sup>2</sup>See R. G. Ball, "The Significance of Simultaneous Methods of Parameter Estimation in Econometric Models", Applied Statistics, Vol. 12, 1963, pp. 14-25.

<sup>3</sup>The selection procedure was systematic based on the methodology developed in Y. Haitovsky "A Note on the Maximization of  $\bar{R}^2$ ", The American Statistician, February 1969, pp.

20-21, and M. Karasek "An Approximate  $\bar{R}^2$  Maximization Scheme: A Tool for Experimenting with Economy-Wide Econometric Models", Working Paper, Econometric Section, Economic Analysis Branch, May, 1970 (unpublished).



$T_p = 1.12097 T_p^*$ (0.01663)	(4-15)	$P_b = -12.5046 + 0.05157 \bar{Y}_p$ (2.71913)(0.00400)	(4-25)
1962-68 $\bar{R}^2 = 0.9987$ DW = 0.7787 VN = 0.9085		1948-68 $\bar{R}^2 = 0.8919$ DW = 1.8094 VN = 1.8999	
$T_p = -2659.75 + 0.98134 (Y_p)_{-1}$ (598.530)(0.03809)	(4-16)	$T_o = -12.2678 + 0.01159 C_p$ (5.14340)(0.00054)	(4-26)
1962-68 $\bar{R}^2 = 0.9910$ DW = 1.4707 VN = 1.7158		1947-68 $\bar{R}^2 = 0.9559$ DW = 1.4439 VN = 1.5126	
$T_x = 1.99919 N_r + 20.1250 t$ (0.01811) (9.68912)	(4-17)	$Y_g = -11.3857 + 0.15388 G_p$ (3.03027)(0.00597)	(4-27)
1962-68 $\bar{R}^2 = 0.9999$ DW = 1.8740 VN = 2.1863		1948-68 $\bar{R}^2 = 0.9708$ DW = 1.1866 VN = 1.2459	
$N_r = 0.81086 (L_e)_{-1} + 89.5671 t$ (0.01245) (6.93043)	(4-18)	EQUATIONS ESTIMATED BY TSLS	
1962-68 $\bar{R}^2 = 0.9998$ DW = 1.9189 VN = 2.2387		$C_p = 0.58740 Y_d + 0.38843 (C_p)_{-1}$ (0.10375) (0.12121)	(4-28)
$T_c = 1.09452 T_c^*$ (0.01498)	(4-19)	1948-68 $\bar{R}^2 = 0.9998$ DW = 0.9946 VN = 1.0444	
1958-67 $\bar{R}^2 = 0.9983$ DW = 1.8728 VN = 2.0809		$I_c = 0.44138 I_m + 0.00201 (M_a)_{-1} + 0.66785 (I_c)_{-1}$ (0.10227) (0.00151) (0.09455)	(4-29)
$Y_c = 596.008 + 0.55953 (P_c)_{-1}$ (121.882) (0.05772)	(4-20)	1948-68 $\bar{R}^2 = 0.9958$ DW = 1.6319 VN = 1.7135	
1958-67 $\bar{R}^2 = 0.9117$ DW = 2.0574 VN = 2.2860		$M_w = 0.20360 GPP + 0.06635 (C_p)_{-1}$ (0.00864) (0.01505)	(4-30)
$T_g = 0.99467 T_g^*$ (0.00346)	(4-21)	1948-68 $\bar{R}^2 = 0.9999$ DW = 2.1922 VN = 2.3018	
1957-68 $\bar{R}^2 = 0.9999$ DW = 2.1283 VN = 2.3218		$Y_w = 4768.00 + 0.57903 GPP - 53.9375 L_p$ (2193.07) (0.00416) (22.5046)	(4-31)
$T_s = 0.09108 T_s^*$ (0.00511)	(4-22)	1948-68 $\bar{R}^2 = 0.9991$ DW = 1.8538 VN = 1.9465	
1961-68 $\bar{R}^2 = 0.9784$ DW = 0.8294 VN = 0.9478		$P_c = 0.11461 GPP + 0.40958 \Delta I_b$ (0.00270) (0.17875)	(4-32)
$H_i = 0.96445 H_i^*$ (0.02635)	(4-23)	1948-68 $\bar{R}^2 = 0.9961$ DW = 1.5106 VN = 1.5861	
1959-68 $\bar{R}^2 = 0.9933$ DW = 2.5097 VN = 2.7886		$C_s = 0.00814 Y_w$ (0.00009)	(4-33)
$V_m = -12.7805 + 0.04962 V_r$ (3.78574)(0.00528)	(4-24)	1948-68 $\bar{R}^2 = 0.9977$ DW = 0.9641 VN = 1.0123	
1948-68 $\bar{R}^2 = 0.8135$ DW = 1.6801 VN = 1.7641		$T_o = -13.8064 + 0.01172 C_p$ (5.57069)(0.00058)	(4-34)
		1948-68 $\bar{R}^2 = 0.9538$ DW = 1.5340 VN = 1.6107	

#### 4.4 Evaluation of Statistical Results

We begin the evaluation of statistical findings with a general discussion of the estimates within the framework of the entire model. In this Section we investigate the statistical significance of the estimated coefficients, the goodness of fit and the assumption of serial independence of the disturbance terms for each equation. In subsequent Sections we discuss each individual relationship in turn and present some additional results obtained

during the experimentation stage of testing alternative specifications.

The explanatory power of a regression relationship fitted by the method of least-squares is measured by the coefficient of multiple determination, denoted by  $R^2$  and defined as the ratio of the "explained" variation to the "total" variation of the observations on the dependent variable about their sample mean. However,  $R^2$  is biased upward because it is directly related to the number of

explanatory variables in the regression so that in general the larger the number of explanatory variables the higher the value of  $R^2$ . For this reason we use the adjusted coefficient of multiple determination, denoted by  $\bar{R}^2$  and defined as

$$\bar{R}^2 = 1 - (1 - R^2) \frac{n-1}{n-k}$$

where  $n$  denotes the sample size and  $k$  the number of variables appearing in the equation. When  $n$  is large  $R^2$  and  $\bar{R}^2$  will be ap-



proximately the same, but when  $n$  is small relative to  $k$ ,  $\bar{R}^2$  will be less than  $R^2$ . Nevertheless,  $\bar{R}^2$  is a better measure of the goodness of fit because it takes account of degrees of freedom and it is an unbiased estimator of the expected explanatory power of a least-squares regression. The coefficients  $\bar{R}^2$  in equations (4-1) to (4-34) are quite high in every case with the exception of equations (4-4) and (4-5) which explain changes in inventories. It was not possible to improve upon these two equations for reasons discussed in the previous Chapter.

The statistical significance of each individual coefficient can be tested quickly by inspection without consulting the tables of the  $t$  distribution. At the conventional 5 per cent probability level, assuming two estimated parameters, the critical value of the  $t$  statistic is 2.093 when the sample consists of 21 observations, and 1.960 when the sample is infinite. Thus disregarding sample size we can see that the critical value of  $t$  centers around 2, which suggests that a particular coefficient will be statistically significant only if its value is at least twice as large as its standard error. From the 54 coefficients in equations (4-1) to (4-27) estimated by OLS, five lack significance, one coefficient in equation (4-3), two in equation (4-4) and two in equation (4-5). The coefficients estimated by TSLS in equations (4-28) to (4-34) are significant except one in equation (4-29). All coefficients have the correct sign in both sets of estimates.

The validity of the significance tests depends on the condition that the disturbance term in each statistical equation satisfies the assumption of serial independence, which implies that successive disturbances are not correlated so that their covariance is vanishing. The violation of this assumption introduces the problem of autocorrelation which affects unfavourably the efficiency of estimators and, therefore, invalidates the standard tests of significance of the regression coefficients.

In general, the existence of autocorrelation in a relationship indicates a mis-specification in the sense that one or more explanatory variables which exert an important influence on the dependent variable have been excluded from the regression and have, therefore, been included in the disturbance term. The result is that the disturbances exhibit a systematic behaviour which contradicts the assumption of serial independence.

The most commonly used tests for autocorrelation are the von-Neumann ratio and the Durbin-Watson  $d$  statistic, which we denote by VN and DW respectively. Strictly speaking the VN test is applicable to large samples and it is questionable whether the test is reliable for small samples. The DW test, on the other hand, is suitable for the small sample case, however, it can be shown that this test is not appropriate when lagged endogenous variables are included in an equation.<sup>4</sup>

The procedure of the VN test is to obtain from tables the two critical values corresponding to positive and negative autocorrelation for a specified sample size and probability level. Then, if the computed VN ratio lies between the two critical values we accept the hypothesis of no autocorrelation, otherwise the hypothesis is rejected. To apply the DW test we find from tables the lower and upper bound of the statistic for a particular sample size and number of independent variables. If the computed DW value is greater than the upper bound we accept the hypothesis of no autocorrelation. Conversely, if the computed DW is less than the lower bound we reject the hypothesis of no autocorrelation and accept the hypothesis of positive autocorrelation. Finally, if the computed DW lies between the lower and upper bounds the test is inconclusive.

For a sample of 21 observations the critical region of the VN test is 1.3805 — 2.8195 at the 5 percent and 1.1131 — 3.0869 at the 1 per cent significance points. For the same sample size the lower and upper bounds of the DW test are 1.13 and 1.54 respectively, for two independent variables and 1.03 and 1.67 for three independent variables. Thus, we can detect the existence of autocorrelation in equations (4-1) and (4-10) in the OLS estimates and (4-28) and (4-33) in the TSLS estimates. The DW test is inconclusive in equations (4-2), (4-5), (4-8) and (4-11) and indicates positive autocorrelation in (4-27). However, these equations pass the VN test.

If one of the tests for autocorrelation indicates that in a particular equation we have autocorrelated disturbances various methods are available to deal with this problem. A method most frequently used in practice consists of a number of steps or iterations as follows: Consider the two variable case where,

$$Y_t = \alpha + \beta X_t + u_t \quad (4-a)$$

Assuming that the error term follows a first-order autoregressive scheme we can write

$$u_t = \rho u_{t-1} + e_t \quad (4-b)$$

where  $\rho$  is the autocorrelation coefficient and  $e$  denotes a random error term having properties. Lagging (4-a) by one period we have

$$Y_{t-1} = \alpha + \beta X_{t-1} + u_{t-1} \quad (4-c)$$

Multiplying (4-c) by  $\rho$  and subtracting from (4-a) we obtain

$$Y_t - \rho Y_{t-1} = \alpha(1-\rho) + \beta(X_t - \rho X_{t-1}) + u_t - \rho u_{t-1} \quad (4-d)$$

The first step of the method is to regress  $Y_t$  on  $X_t$  in (4-a) to obtain the estimates  $\hat{\alpha}$  and  $\hat{\beta}$  and compute the residuals

$$\hat{u}_t = Y_t - \hat{\alpha} - \hat{\beta} X_t$$

If the residuals are not random we proceed to the second step, which consists of regressing  $\hat{u}_t$  on  $\hat{u}_{t-1}$  in (4-b) to obtain  $\hat{\rho}$ , an estimate of  $\rho$ , and transform the variables by  $\hat{\rho}$  in (4-d). In the final step we regress  $(Y_t - \hat{\rho} Y_{t-1})$  on  $(X_t - \hat{\rho} X_{t-1})$  in (4-d) to derive a new set of estimates. We compute the new set of residuals and test for randomness. If not random we go back to step two and so on until we obtain random residuals.

This iterative procedure was employed to remove the presence of autocorrelation in equations (4-6), (4-9), (4-11), (4-14), (4-24) and (4-25). The export equation derived initially was as follows:

$$E_w = -1143.57 + 10.1177 Y_{us} \quad (4-35) \\ (239.630) (0.46981)$$

$$1947-68 \quad \bar{R}^2 = 0.9566$$

$$DW = 0.2597 \quad VN = 0.2721$$

One iteration yielded the equation

$$E_w = -197.765 + 15.4291 Y_{us} \quad (4-6) \\ (74.1155) (1.69192)$$

$$1948-68 \quad \bar{R}^2 = 0.8042$$

$$DW = 2.1883 \quad VN = 2.2977$$

The estimated equation for  $Y_b$  was at first

$$Y_b = 354.336 + 0.04797 (GPP - \Delta I_f) \\ (36.2476) (0.00236) \quad (4-36)$$

$$1947-68 \quad \bar{R}^2 = 0.9517$$

$$DW = 0.4350 \quad VN = 0.4558$$

Applying one iteration yielded the result

$$Y_b = 114.901 + 0.04263 (GPP - \Delta I_f) \\ (22.3920) (0.00459) \quad (4-9)$$

$$1948-68 \quad \bar{R}^2 = 0.8100$$

$$DW = 2.0130 \quad VN = 2.1136$$

<sup>4</sup>See M. Nerlove and K. F. Wallis, "Use of the Durbin-Watson Statistic in Inappropriate Situations", *Econometrica*, Vol. 34, No. 1 (January, 1966) pp. 235-238, and J. Durbin,

"Testing for Serial Correlation in Least-Squares Regression when some of the Regressors are Lagged Dependent Variables", *Econometrica*, Vol. 38, No. 3 (May, 1970) pp. 410-421.



The equation explaining  $Y_i$  was initially estimated as

$$Y_i = 166.104 + 0.60645 [S_p + (S_p)_{-1}] \quad (4-37)$$

(24.4185)(0.01711)

$$1948-68 \quad \bar{R}^2 = 0.9843$$

$$DW = 0.4815 \quad VN = 0.5056$$

One iteration resulted in

$$Y_i = 37.2239 + 0.60846 [S_p + (S_p)_{-1}] \quad (4-11)$$

(16.7488) (0.03218)

$$1949-68 \quad \bar{R}^2 = 0.9494$$

$$DW = 1.2861 \quad VN = 1.3538$$

The equation for  $C_s$  before transforming the variables was

$$C_s = 0.00812 Y_w \quad (4-38)$$

(0.00009)

$$1947-68 \quad \bar{R}^2 = 0.9976$$

$$DW = 0.9595 \quad VN = 1.0052$$

With one transformation we derived the equation

$$C_s = 0.00814 Y_w \quad (4-14)$$

(0.00013)

$$1948-68 \quad \bar{R}^2 = 0.9948$$

$$DW = 1.6268 \quad VN = 1.7075$$

The equation for motor vehicle licences and permits without transformation read as

$$V_r = -32.9951 + 0.04807 V_r \quad (4-39)$$

(4.45637)(0.00233)

$$1948-68 \quad \bar{R}^2 = 0.9528$$

$$DW = 0.6108 \quad VN = 0.6399$$

One iteration produced the result

$$V_m = -12.7805 + 0.04962 V_r \quad (4-24)$$

(3.78574)(0.00528)

$$1948-68 \quad \bar{R}^2 = 0.8135$$

$$DW = 1.6801 \quad VN = 1.7641$$

Finally, the equation for profits of liquor commissions was in the first instance as follows:

$$P_b = -42.1221 + 0.05351 \bar{Y}_p \quad (4-40)$$

(4.73522)(0.00245)

$$1948-68 \quad \bar{R}^2 = 0.9596$$

$$DW = 0.4470 \quad VN = 0.4693$$

A single transformation of variables gave the estimates

$$P_b = -12.5046 + 0.05157 \bar{Y}_p \quad (4-25)$$

(2.71913)(0.00400)

$$1948-68 \quad \bar{R}^2 = 0.8919$$

$$DW = 1.8094 \quad VN = 1.8999$$

Looking at these results we can observe that the transformation of variables had the

favourable effect of improving the values of DW and VN and thus helped to remove the serial correlation of the disturbance term in each relationship. However, after each transformation the resulting  $\bar{R}^2$  was lower and the values of the regression coefficients were altered considerably in some cases, particularly in the export equation and the consumption function, as can be seen from the following results:

The initial version of the consumption equation reads as follows:

$$C_p = 0.60864 Y_d + 0.36328 (C_p)_{-1} \quad (4-1)$$

(0.08397) (0.09815)

$$1948-68 \quad \bar{R}^2 = 0.9999$$

$$DW = 0.4082 \quad VN = 0.4286$$

After two iterations we obtained the result

$$C_p = 0.87960 Y_d + 0.02012 (C_p)_{-1} \quad (4-41)$$

(0.00646) (0.00763)

$$1950-68 \quad \bar{R}^2 = 0.9998$$

$$DW = 0.6673 \quad VN = 0.7044$$

In view of the low values for DW and VN we attempted one more iteration which gave

$$C_p = 0.87536 Y_d + 0.01655 (C_p)_{-1} \quad (4-42)$$

(0.004031) (0.00467)

$$1951-68 \quad \bar{R}^2 = 0.9997$$

$$DW = 2.1626 \quad VN = 2.2898$$

Each transformation of the consumption equation had the effect of increasing the coefficient of the income variable from 0.60864 in (4-1) to 0.87536 in (4-42), and lowering

the coefficient of the lagged consumption variable from 0.36328 to 0.01655 between the original equation (4-1) and the transformed equation (4-42). Due to this change in coefficients we are reluctant to accept equation (4-42) because it places very little importance on the influence of past consumption contrary to economic theory. We consider equation (4-1) as more reliable despite the presence of autocorrelation remembering that the DW test is not suitable in this case.

For similar reasons we have retained in the model equation (4-10) although the disturbance term fails the tests for autocorrelation.

This equation has the form

$$Y_t = 0.28207 \Delta X_t + 2.91652 P_t \quad (4-10)$$

(0.13133) (0.08833)

$$1948-68 \quad \bar{R}^2 = 0.9881$$

$$DW = 0.4306 \quad VN = 0.4521$$

An attempt to remove autocorrelation produced the result

$$Y_t = 0.02344 \Delta X_t + 0.32464 P_t \quad (4-43)$$

(0.12629) (0.36359)

$$1949-68 \quad \bar{R}^2 = 0.8096$$

$$DW = 1.9957 \quad VN = 2.1007$$

Although the transformation in (4-43) has solved the problem of autocorrelation the regression coefficients have changed dramatically in relation to their corresponding values in (4-10). Moreover both coefficients have lost their significance in (4-43). From alternative specifications of the equation for

Table 4-1 — Comparison of Parameter Values Estimated by OLS and TSLS

Dependent Variable	Explanatory Variable	Estimated Parameters		Absolute Change	Percentage Change
		OLS	TSLS		
$C_p$	$Y_d$	0.60864	0.58740	-0.02124	-3.49
$C_p$	$(C_p)_{-1}$	0.36328	0.38843	+0.02515	+6.92
$I_c$	$I_m$	0.42143	0.44138	+0.01995	+4.73
$I_c$	$(M_a)_{-1}$	0.00194	0.00201	+0.00007	+3.60
$I_c$	$(I_c)_{-1}$	0.68579	0.66785	-0.01794	-2.61
$M_w$	GPP	0.20248	0.20360	+0.00112	+0.55
$M_w$	$(C_p)_{-1}$	0.06717	0.06635	-0.00082	-1.22
$Y_w$	GPP	0.57687	0.57903	+0.00216	+0.37
$Y_w$	$L_p$	-56.2500	-53.9375	-2.3125	-4.11
$P_c$	GPP	0.11420	0.11461	+0.00041	+0.36
$P_c$	$\Delta I_b$	0.41328	0.40958	-0.00370	-0.90
$C_s$	$Y_w$	0.00814	0.00814	0.0	0.0
$T_o$	$C_p$	0.01159	0.01172	+0.00013	+1.11



$Y_t$  we have found that the price variable,  $P_t$ , has always exercised a strong positive effect on  $Y_t$ . For these reasons equation (4-43) was rejected in favour of (4-10) regardless of the presence of autocorrelation.

4.5 Comparison of OLS and TSLS Estimates

The adjusted coefficient of multiple determination,  $\bar{R}^2$ , has remained practically the same as we move from OLS to the TSLS estimates. The DW values obtained by the TSLS method are higher for some equations and lower for others. Generally speaking, we observe a slight increase in the standard errors of coefficients in the TSLS set, however, none of the coefficients has lost its statistical significance. The numerical values of coefficients have fluctuated between the OLS and TSLS estimates as shown in Table 4-1.

The percentage change ranges from zero to 6.9 per cent. No change has occurred in the coefficient of the variable  $Y_w$ , while the largest change was observed for the coefficient of  $(C_p)_{-1}$  in the consumption equation. In more than half of the coefficients the recorded change was less than the mean change of 2.49 per cent. The median change is 1.22 per cent which suggests that in general the magnitude of change between the OLS and TSLS estimates is small enough to be considered insignificant for all practical purposes.

4.6 The Estimated Consumption Equation

In the specification of the consumption function we imposed the *a priori* restriction  $\beta_1 + \gamma_1 = 1$  on the coefficients on the basis of the Ball and Drake theory. Looking at the numerical values of the estimated parameters we observe that this restriction is, in fact, satisfied since in equation (4-1) estimated by OLS we have  $\beta_1 + \gamma_1 = 0.97192$ , whereas in equation (4-28) estimated by TSLS we obtain  $\beta_1 + \gamma_1 = 0.99583$  which is even closer to one.

From the estimated consumption equations (4-1) and (4-28) we can derive numerical values for the income elasticity and the marginal propensity to consume. The short-run marginal propensity to consume measures the change in consumption resulting from a unit change in income, *ceteris paribus*, and it is given by the coefficient of the income variable which represents the partial derivative of current consumption with respect to current income. To compute the long-run marginal propensity to consume we must make allow-

ance for the second explanatory variable  $(C_p)_{-1}$  in the consumption function, which measures habit formation of consumers. This propensity is calculated at the stationary point  $C_p = (C_p)_{-1}$ .

Numerical values for the short and long-run marginal propensities to consume based on the OLS and TSLS consumption equations are shown in Table 4-2.

Table 4-2 – Short-run and Long-run Marginal Propensities to Consume

	Short-run	Long-run
OLS	0.6086	0.9559
TSLS	0.5874	0.9605

As can be seen in this Table there is a close agreement between the OLS and TSLS propensities. The long-run propensities are higher relative to the short-run which is in accordance with *a priori* expectations based on economic theory. These propensities indicate that for each additional dollar of income earned net of taxes, Ontarians spend 60 cents on personal consumption while in the long-run they tend to spend about 96 cents.

Using the marginal propensities to consume we can calculate the short-run and long-run partial income elasticities which measure the percentage change in consumption resulting from a change of one per cent in disposable income. These elasticities com-

puted at the point of sample means are given in Table 4-3.

Table 4-3 – Short-run and Long-run Partial Income Elasticities

	Short-run	Long-run
OLS	0.6580	1.033
TSLS	0.6350	1.038

As in the case of propensities, we observe in Table 4-3 a close correspondence between the OLS and TSLS elasticities with the long-run elasticities much greater in value than the short-run. These figures suggest that a one per cent change in income will result in about the same change in consumption in the long-run and about two-thirds of one per cent in the short-run.

Further experiments with the consumption function were carried out utilizing changes and past levels of income as explanatory variables. The results of these experiments are presented in Table 4-4. The goodness of fit is very high in all equations, as is commonly the case with estimated consumption functions, however, the DW values are quite unsatisfactory. All coefficients in this Table are statistically significant with the exception of the coefficient attached to the lagged income variable in equation (4-44). This variable was introduced in (4-44) and (4-48) in an attempt to disentangle the interdependent

Table 4-4 – Equations for Personal Consumption Expenditure,  $C_p$ , 1948-68  
OLS Estimates

Equation	Explanatory Variables				Constant Term	$\bar{R}^2$	DW
	$(C_p)_{-1}$	$(Y_d)_{-1}$	$\Delta Y_d$	$Y_d$			
(4-44)	0.92188 (0.37270)	0.13672 (0.34380)				0.9995	0.2968
(4-45)		0.89172 (0.00163)	0.83487 (0.01596)		362.843 (10.1463)	0.9999	0.5493
(4-46)		0.05713 (0.01730)		0.83447 (0.01600)	362.805 (10.1840)	0.9999	0.5467
(4-47)	1.00012 (0.00035)		0.86615 (0.00302)		12.5625 (2.00187)	0.9999	1.0803
(4-48)		0.95759 (0.01253)			354.117 (122.133)	0.9966	1.0000



nature of the model. Equation (4-48) will be used eventually in the recursive model which, as mentioned in Section 3.19, results from the present model after the consumption equation (4-1) is replaced by either (4-44) or (4-48). The import function is re-specified to include  $(GPP)_{-1}$  rather than GPP as an explanatory variable.

The forecasting ability of the estimated consumption equations can be roughly evaluated by comparing point forecasts with the actual value of  $C_p$  in 1969 as shown in Table 4-5. The forecasting performance of equation (4-1), which overestimates consumption by 1.06 per cent, is superior relative to equation (4-41) with transformed variables, which underestimates  $C_p$  by 1.12 per cent. The TSLS equation (4-28) performs slightly better than the OLS equation (4-1). The best forecast is obtained from equation (4-47) where the forecast error is only 0.35 per cent. The worst forecast results from equation (4-44) but this is not surprising in view of the fact that the coefficient of the income variable is not statistically significant.

Table 4-5 – Point Forecasts of  $C_p$  for 1969

Equation	Actual Value	Forecast Value	Forecast Error (%)
(4-1)	18111	18303	-1.06
(4-41)	18111	17909	+1.12
(4-28)	18111	18293	-1.00
(4-44)	18111	17847	+1.46
(4-45)	18111	18226	-0.64
(4-46)	18111	18223	-0.62
(4-47)	18111	18175	-0.35
(4-48)	18111	17955	+0.86

The results in Table 4-5 provide only a rough test of the forecasting ability of alternative consumption functions. It must be emphasized that a single observation beyond the period of fit is not sufficient to evaluate the predictive power of an equation either individually or within the context of the entire model.

#### 4.7 The Equation for Investment in Machinery and Equipment

The statistical criteria of goodness of fit, absence of autocorrelation in the residuals and significance of coefficients are well satisfied in equation (4-2). The predictive ability of this equation within the sample period is illustrated in Table 4-6. The prediction error ranges from 0.11 per cent in 1959 to 13.65

per cent in 1963. The equation predicts correctly the slack in  $I_m$  in 1954 and 1958 and the upturn in business investment during the period 1962-66, but it fails to predict the direction of change in 1961, 1967 and 1968.

At this stage we decided to perform additional experiments with explanatory variables denoting past levels of GPP and year-to-year changes in factory shipments. An attempt was also made to introduce Canadian GNP into the regressions to capture the influence of economic activity at the national level on the Ontario economy. Four equations selected

from a wider range of results are presented in Table 4-7. The DW value is very low in all equations, except (4-50), indicating the presence of serial correlation in the disturbance terms. Moreover, the GNP variable is insignificant in (4-51) and the coefficient of lagged GPP in (4-52) has the wrong sign. A residual analysis of equation (4-50), similar to Table 4-6 indicated that the direction of change in  $I_m$  predicted by this equation was the same as the one predicted by equation (4-2), but the magnitude of change was greater.

Table 4-6 – Actual and Predicted Values of the Dependent Variable,  $I_m$ , in Equation (4-2), 1948-68

Year	Actual Value	Predicted Value	Residuals	Prediction Error (%)
1948	442	472	-30	-6.79
1949	457	432	25	5.47
1950	494	512	-18	-3.64
1951	685	640	45	6.57
1952	677	666	11	1.62
1953	747	749	-2	-0.27
1954	699	642	57	8.15
1955	704	730	-26	-3.69
1956	948	886	62	6.54
1957	1059	995	64	6.04
1958	842	851	-9	-1.07
1959	879	878	1	0.11
1960	922	927	-5	-0.54
1961	877	967	-90	-10.26
1962	983	997	-14	-1.42
1963	1055	1199	-144	-13.65
1964	1345	1321	24	1.78
1965	1674	1636	38	2.27
1966	1975	1920	55	2.78
1967	1998	1905	92	4.60
1968	1895	2018	-123	-6.49

Table 4-7 – Equations for Investment in Machinery and Equipment,  $I_m$ , 1948-68  
OLS Estimates

Equation	Explanatory Variables					$\bar{R}^2$	DW
	$(P_c)_{-1}$	$(I_m)_{-1}$	$(GPP)_{-1}$	$\Delta S_f$	GNP		
(4-49)		0.57436 (0.24384)	0.03551 (0.01765)			0.9864	1.2486
(4-50)	0.26853 (0.09115)	0.53253 (0.14021)		0.11111 (0.03584)		0.9944	1.4255
(4-51)	0.59538 (0.24632)				0.00186 (0.01072)	0.9890	0.6368
(4-52)	0.68994 (0.18958)		-0.01700 (0.02268)			0.05134 (0.01721)	0.9925 0.9069



The forecasting performance of the estimated equations for  $I_m$  is shown in Table 4-8. The forecast error ranges from 3.69 per cent in equation (4-2) to 23.60 per cent in (4-52). It is interesting to note in Table 4-8 that the forecast error is positive in every case, which indicates that the forecasts underestimate the true value of  $I_m$  in 1969. This may be explained by the fact that business investment in machinery and equipment increased by \$380 million in 1969 relative to 1968, which was the largest increase since 1948. It is not surprising, therefore, that none of the equations were able to predict this dramatic upsurge in  $I_m$ , the magnitude of which had not occurred in the sample period.

Table 4-8 — Point Forecasts of  $I_m$  for 1969

Equation	Actual Value	Forecast Value	Forecast Error (%)
(4-2)	2275	2191	+3.69
(4-49)	2275	2101	+7.65
(4-50)	2275	1981	+12.92
(4-51)	2275	2032	+10.68
(4-52)	2275	1738	+23.60

Table 4-9 — Equations for Investment in Construction,  $I_c$ , 1948-68  
OLS Estimates

Explanatory Variables				Constant Term	$\bar{R}^2$	DW
Equation	$I_m$	$(I_c)_{-1}$	$Y_d + (Y_d)_{-1} + (Y_d)_{-2}$			
(4-53)	0.42355 (0.09937)	0.74558 (0.07953)			0.9956	1.8445
(4-54)	0.47670 (0.13476)		0.02696 (0.01010)	204.930 (108.045)	0.8997	0.5638
(4-55)	0.47514 (0.12123)	0.80992 (0.11670)	-0.00508 (0.00667)		0.9955	2.0666

Table 4-10 — Matrix of Zero-Order Correlation Coefficients

$I_c$	$I_m$	$(I_c)_{-1}$	$(M_a)_{-1}$	$Y_d + (Y_d)_{-1} + (Y_d)_{-2}$
1.0000	0.9368	0.9708	0.8714	0.9425
	1.0000	0.8796	0.8548	0.9184
		1.0000	0.8335	0.9437
			1.0000	0.7901
				1.0000

Table 4-11 — Actual and Predicted Values of the Dependent Variable  $I_c$  in Equations (4-3) and (4-29), 1948-68

Year	Actual Value	Predicted Value		Prediction Error (%)	
		OLS	TSLS	OLS	TSLS
1948	525	541	559	-3.05	-6.48
1949	625	636	628	-1.76	-0.48
1950	739	721	730	2.44	1.22
1951	842	880	864	-4.51	-2.61
1952	864	950	947	-9.95	-9.61
1953	1031	995	998	3.49	3.20
1954	1090	1091	1064	-0.09	2.39
1955	1224	1131	1141	7.60	6.78
1956	1453	1325	1298	8.81	10.67
1957	1620	1532	1503	5.43	7.22
1958	1719	1557	1551	9.42	9.77
1959	1464	1638	1628	-11.89	-11.20
1960	1395	1483	1480	-6.30	-6.09
1961	1342	1415	1449	-5.44	-7.38
1962	1363	1421	1426	-4.26	-4.08
1963	1469	1465	1529	0.27	-4.08
1964	1709	1662	1655	2.75	3.16
1965	1845	1972	1961	-6.88	-6.29
1966	2258	2197	2183	2.70	3.32
1967	2376	2496	2458	-5.05	-3.45
1968	2681	2541	2594	5.22	3.25

In other specifications, not reported here, the current level of income,  $Y_d$ , was used but the estimated coefficient although significant had the wrong sign.

**4.8 The Equation for Investment in Construction**

The numerical values of coefficients in the OLS equation (4-3) are quite close in magnitude with those in the TSLS equation (4-29). These equations are free from autocorrelation and possess the same explanatory power, but the demographic variable,  $(M_a)_{-1}$ , is not statistically significant in either equation. Table 4-9 shows three regression equations in which  $(M_a)_{-1}$  was replaced by a variable representing the sum of current and past levels of income.

The income variable is significant in equations with two explanatory variables like (4-54), but loses its significance in four-variable regressions as in (4-55). This difficulty arises because the independent variables are highly collinear as indicated by the zero-order correlation matrix in Table 4-10.

The predictive power of the OLS and TSLS equations of the model within the



sample period can be judged from the results of Table 4-11. Both equations predict correctly the direction of change in  $I_c$  during the upswing in building activity in the periods 1948-58 and 1962-68. The turning point in the building cycle, which occurred in 1959, is predicted by the equations with a time lag of one year. The prediction error of the OLS equation ranges from 0.27 per cent in 1963 to 11.89 per cent in 1959. The smallest error of the TSLS equation occurs in 1949 and the largest in 1959. Relatively large errors result from both equations in the years 1952, 1956, 1958 and 1959.

Forecasts for the year 1969 are shown in Table 4-12. Equation (4-3) estimated by OLS performs slightly better relative to the TSLS equation (4-29). The smallest forecast error occurs in equation (4-55) but the negative coefficient of the income variable leads to the rejection of the result on economic grounds. Equation (4-53) does quite well depending on its performance in subsequent years it may prove to be a good forecasting relationship.

Table 4-12 — Point Forecasts of  $I_c$  for 1969

Equation	Actual Value	Forecast Value	Forecast Error (%)
(4-3)	2972	2933	+1.31
(4-29)	2972	2912	+2.01
(4-53)	2972	2962	+0.34
(4-54)	2972	2582	+13.12
(4-55)	2972	2970	+0.07

#### 4.9 Changes in Non-farm Business Inventories

Changes in business inventories can hardly be explained with annual models. Among various regression relationships equation (4-4) was selected, which explains 74 per cent of the variation in  $\Delta I_b$ . Although the residuals are not serially correlated only one out of these estimated parameters is significant. This equation forecasts \$245 million change in business inventories between 1968 and 1969 which underestimates the actual change of \$297 million by 17.51 per cent.

#### 4.10 Changes in Farm Inventories

Equation (4-5) for  $\Delta I_f$  is the weakest in the model. Two of the estimated parameters are statistically significant, namely, the

constant term and the coefficient of  $(I_f)_{-1}$ . The coefficients of the variables  $P_f$  and  $X_f$  are almost significant at the conventional 5 per cent probability level. Although the equation is free from autocorrelation the value of  $\bar{R}^2$  is exceedingly low explaining no more than 25 per cent of the variation in the dependent variable.

A considerable amount of experimentation was carried out, in an attempt to increase the explanatory power of the equation which, however, failed to produce satisfactory results. The movements of  $\Delta I_f$  over the sample period have been very erratic beyond the point where they can be accurately predicted.

#### 4.11 The Estimated Export Equation

Equations (4-35) and (4-6) explain Ontario exports to the rest of the world,  $E_w$ . In equation (4-6) the iteration method of variable transformation was employed to remove autocorrelation. For reasons discussed in Section 3.7 the export equation has been misspecified by excluding relative prices (export price index/domestic price index). Using the foreign exchange rate between U.S. and Canadian currency as a proxy for relative prices we estimated the equation

$$E_w = -5081.44 + 41.0142 F_x + 9.55038 Y_{us} \quad (4-56)$$

(1792.85) (18.8626) (0.55278)

$$1948-68 \quad \bar{R}^2 = 0.9624$$

$$DW = 0.4878 \quad VN = 0.5122$$

where  $F_x$  denotes the ratio of Canadian to U.S. dollars expressed as a percentage.

All coefficients in (4-56) are significant and  $\bar{R}^2$  is high but the DW value is very low indicating positive autocorrelation in the residuals.

Forecasts derived from the export equations are shown in Table 4-13. Equation (4-6) with transformed variables provides a poor forecast relative to (4-35), whereas equation (4-56) predicts slightly better.

Table 4-13 — Point Forecasts of  $E_w$  for 1969

Equation	Actual Value	Forecast Value	Forecast Error (%)
(4-6)	9318	14186	-52.24
(4-35)	9318	8289	+11.04
(4-56)	9318	8334	+10.56

#### 4.12 The Estimated Import Equation

The demand for Ontario imports from abroad is explained by equation (4-7) estimated by the OLS method and equation (4-30) estimated by TSLS. Both equations contain highly significant coefficients and possess exceptionally high explanatory power. The VN values provide assurance that autocorrelation does not exist.

The short-run marginal propensity to import resulting from equations (4-7) and (4-30) is approximately 0.203. The short-run and long-run partial income elasticities, computed at the point of sample means are given in Table 4-14. In the short-run the income elasticity is about 0.84 and rises in the long-run to about 0.90.

Table 4-14 — Short-run and Long-run Partial Income Elasticities

	Short-run	Long-run
OLS	0.8389	0.8993
TSLS	0.8435	0.9035

In addition to (4-7) and (4-30) three alternative import equations were estimated by OLS as follows:

$$M_w = 0.26136 (GPP)_{-1} \quad (4-57)$$

(0.00141)

$$1948-68 \quad \bar{R}^2 = 0.9994$$

$$DW = 1.7852 \quad VN = 1.8744$$

$$M_w = 26.6250 + 0.18288 GPP + 0.25366 (M_w)_{-1} \quad (4-58)$$

(16.8144) (0.01213) (0.05562)

$$1948-68 \quad \bar{R}^2 = 0.9996$$

$$DW = 2.1396 \quad VN = 2.2465$$

$$M_w = 494.000 + 0.24025 GPP - 4.67969 F_x \quad (4-59)$$

(196.125) (0.00162) (2.03443)

$$1948-68 \quad \bar{R}^2 = 0.9994$$

$$DW = 1.3505 \quad VN = 1.4180$$

The regression coefficients are highly significant with the exception of the constant term in equation (4-58).  $\bar{R}^2$  is exceptionally high and the measures of first-order autocorrelation suggest randomness in the residuals.

The forecasting performance of the import equations beyond the sample period is excellent as can be seen from the results reported in Table 4-15. The magnitude of the



forecast error is quite small ranging from 0.01 to 1.86 per cent.

Table 4-15 — Point Forecasts of  $M_w$  for 1969

Equation	Actual Value	Forecast Value	Forecast Error (%)
(4-7)	7594	7653	−0.78
(4-30)	7594	7673	−1.04
(4-57)	7594	7453	+1.86
(4-58)	7594	7558	+0.47
(4-59)	7594	7595	−0.01

4.13 The Estimated Equation for Wages and Salaries

Equations (4-8) and (4-31) explaining  $Y_w$  are quite satisfactory from the statistical point of view. The TSLS equation might be preferred over the OLS equation because of the higher DW and VN values. The negative coefficient of the variable  $L_p$  in both equations is justified on theoretical grounds since it measures the cyclical effects on  $Y_w$ . As the percentage of labour employed goes up in the upswing unskilled workers whose average earnings are less than those already employed enter the labour force<sup>5</sup>. The converse is the case in the downswing of the cycle.

Forecasts for 1969 obtained from these equations are shown in Table 4-16. The TSLS equation gives a better forecast compared with the OLS equation. However, the difference between the two forecasts is not very great in magnitude.

Table 4-16 — Point Forecasts of  $Y_w$  for 1969

Equation	Actual Value	Forecast Value	Forecast Error (%)
(4-8)	18216	17849	+2.01
(4-31)	18216	17901	+1.73

Wages and salaries of Ontario employees may be affected by development at the national level. To test this hypothesis we fitted a number of regressions using national variables on the right-hand side. Table 4-17 presents four equations selected from these experiments.

<sup>5</sup>See L. H. Officer. *An Econometric Model of Canada under the Fluctuating Exchange Rate*, Harvard University Press, Cambridge, Massachusetts, 1968, p. 95.

Table 4-17 — Equations for Wages and Salaries,  $Y_w$ , 1948-68  
OLS Estimates

Explanatory Variables									
Equation	GPP	$L_e$	GNP	$NY_w$	$L_p$	Constant Term	$\bar{R}^2$	DW	
(4-60)	0.54858 (0.03333)	0.60938 (0.65800)				−1344.00 (963.463)	0.9991	1.0414	
(4-61)	0.48755 (0.08813)		0.03613 (0.03488)			−460.687 (59.1164)	0.9992	0.9935	
(4-62)	0.03125 (0.10895)			0.47095 (0.09433)		653.000 (62.0256)	0.9995	0.3466	
(4-63)	0.03125 (0.06622)			0.47388 (0.05740)	−6.91406 (0.41191)		0.9999	0.9843	

The coefficient of  $L_e$  in (4-60) lacks significance. The same is true for the coefficient of GNP in (4-61). The variable  $NY_w$  in equations (4-62) and (4-63), denoting wages and salaries at the national level, is statistically significant but its inclusion in the regression forces the GPP variable to lose its significance. In general, we have observed in a number of experiments strong multicollinearity between provincial and national variables which makes it impossible to measure their separate effect on the dependent variable.

4.14 The Equation for Unincorporated Business Income

It was mentioned in Section (4-4) that equation (4-9) was obtained from (4-36) after a transformation of variables to remove serial correlation in the residuals. The 1969 forecasts for  $Y_b$  generated by these equations are given in Table 4-18.

Table 4-18 — Point Forecasts of  $Y_b$  for 1969

Equation	Actual Value	Forecast Value	Forecast Error (%)
(4-9)	1751	1451	+17.13
(4-36)	1751	1858	−6.11

Evidently, equation (4-36) produces a better forecast regardless of autocorrelation. An attempt to improve upon (4-36) by introducing a time trend gave the following result:

$$Y_b = 430.035 + 0.02349 (GPP - \Delta I_f)$$

(36.3806)(0.00775)

+ 25.500 t

(8.10380)

1948-68

$\bar{R}^2 = 0.9658$

DW = 0.6755

VN = 0.7092

Although the autocorrelation problem remains unsolved equation (4-64) yields a forecast value of 1691 which is only 3.42 per cent off the mark.

4.15 Income of Farm Operators from Farm Production

In equation (4-10) both coefficients are significant and the goodness of fit is quite satisfactory but the DW value is exceedingly low indicating the presence of positive correlation of the disturbances. Various hypotheses were tested, about the causal factors affecting  $Y_f$ , but the results were unsatisfactory. Equation (4-10) provides a 1969 forecast value for  $Y_f$  of the order of \$394 million as opposed to the actual level of \$450 million. The forecast error is 12.44 per cent.

4.16 Interest, Dividends and Miscellaneous Investment Income

The endogenous variable  $Y_i$  is explained by equations (4-11) and (4-37). The coefficients of the savings variable are of the same order of magnitude in both equations. However, the constant term is much lower in equation (4-11) with transformed variables. The significance of this change in the numerical value of the constant can be evaluated in the light of the 1969 forecasts of Table



Table 4-19 — Point Forecasts of  $Y_1$  for 1969

Equation	Actual Value	Forecast Value	Forecast Error (%)
(4-37)	2167	2221	-2.49
(4-11)	2167	2098	+3.18

4-19. The forecast of equation (4-37) with the larger constant overstates the true value of  $Y_1$  by 2.49 per cent, whereas equation (4-11) with the smaller constant term understates the actual value by 3.18 per cent.

#### 4.17 The Estimated Equation for Corporate Profits

The corporate profits equation was estimated by OLS and TSLS. The OLS equation (4-12) originally included a constant term, which was subsequently dropped because its standard error was large relative to its value. Consequently, the TSLS equation (4-32) was fitted with a suppressed constant. The regression coefficients are highly significant in both equations and the values of  $\bar{R}^2$  are exceptionally high explaining more than 99 per cent of the variation in  $P_c$ . The DW values fall into the inconclusive range whereas the VN values indicate the absence of autocorrelation.

Other specifications utilizing national variables failed to produce satisfactory results. The most acceptable equation included profits of Canadian corporations  $NP_c$  as follows:

$$P_c = 0.03984 \text{ GPP} + 0.28032 NP_c \quad (4-65)$$

(0.01556)      (0.05495)

$$1947-68 \quad \bar{R}^2 = 0.9978$$

$$DW = 1.0668 \quad VN = 1.1176$$

The DW value indicates the existence of positive autocorrelation but the VN test is satisfied at the one per cent level of significance.

Table 4-20 contains forecasts of  $P_c$  beyond the observation period derived from equations (4-12), (4-32) and (4-65).

Table 4-20 — Point Forecasts of  $P_c$  for 1969

Equation	Actual Value	Forecast Value	Forecast Error (%)
(4-12)	3298	3743	-13.49
(4-32)	3298	3755	-13.86
(4-65)	3298	3464	-5.03

The forecast of (4-65) is superior relative to the forecasts of (4-12) and (4-32).

**4.18 The Equation for Corporate Dividends**  
Equation (4-13) explaining dividend payments of Ontario corporations stands up to all statistical tests. The predictive power of this equation within and beyond the period of fit is remarkable. The 1969 forecast value for  $D_v$  is \$829 million which comes quite close to the actual value of \$831 million.

#### 4.19 Contributions to Social Insurance and Pension Funds

Equations (4-33) and (4-14) explaining  $C_s$  contain identical parameter values and yield identical forecasts for 1969. The forecast value for  $C_s$  is \$148 million relative to the true value of \$139 million.

#### 4.20 The Personal Income Tax Equations

The personal income tax sub-model consists of the identities (3-34) to (3-41) reported in the previous Chapter and the estimated statistical relationships (4-15) to (4-18). The stochastic equations have been estimated by OLS on the basis of seven observations for the period 1962-68. Due to the small size of sample the measures of first-order autocorrelation are not applicable.

The total number of taxable returns of individuals,  $N_r$ , is explained by equation (4-18),<sup>6</sup> whereas the number of taxable returns in the  $i$ th income class,  $(N_r)_i$ , can be obtained from identities (3-40) and (3-41), given the proportion  $(P_r)_i$  of taxable returns in each income class. These proportions have exhibited a systematic trend over the sample period as can be seen in Table 4-21. The proportions  $(P_r)_3$  and  $(P_r)_4$  of the two upper income classes are monotonically increasing

Table 4-21 — Proportion of Taxable Returns in the  $i$ th Income Class, 1962-68

Year	$(P_r)_1$	$(P_r)_2$	$(P_r)_3$	$(P_r)_4$
1962	0.295	0.391	0.271	0.043
1963	0.296	0.374	0.284	0.046
1964	0.278	0.353	0.319	0.050
1965	0.265	0.327	0.351	0.057
1966	0.250	0.306	0.376	0.068
1967	0.232	0.287	0.399	0.082
1968	0.216	0.259	0.424	0.101

whereas the proportion  $(P_r)_2$  of the second income class is a monotonically decreasing function of time. Hence, these proportions

<sup>6</sup>In equation (4-18)  $N_r$  is regressed on past levels of employment. Regressing  $N_r$  on current  $L_e$  results in the OLS equation

$$N_r = 0.79117 L_e - 85.9579 t$$

(0.01149)      (6.60161)

$$\bar{R}^2 = 0.9999 \quad VN = 2.0055$$

can be forecast beyond 1968 on the basis of a time trend using the following equations:

$$(P_r)_2 = 0.41629 - 0.02204 t \quad (4-66)$$

(0.00241)      (0.00054)

$$1962-68 \quad \bar{R}^2 = 0.9964$$

$$DW = 2.1559 \quad VN = 2.5152$$

$$(P_r)_3 = 0.23971 + 0.02664 t \quad (4-67)$$

(0.00447)      (0.00099)

$$1962-68 \quad \bar{R}^2 = 0.9916$$

$$DW = 2.1689 \quad VN = 2.5304$$

$$(P_r)_4 = 0.02614 + 0.00943 t \quad (4-68)$$

(0.00573)      (0.00128)

$$1962-68 \quad \bar{R}^2 = 0.8986$$

$$DW = 0.8344 \quad VN = 0.9735$$

Since  $(N_r)_1$  is obtained as a residual from identity (3-40) the proportion  $(P_r)_1$  is not required for forecasting purposes.

Total personal income assessed,  $Y_a$ , of Ontario taxpayers is explained by equation (4-16).<sup>7</sup> Personal income assessed in the first income class,  $(Y_a)_1$ , is derived residually from identity (3-36). Personal income assessed in the second, third and fourth income classes is obtained from (3-37) given the proportions  $(P_y)_2$ ,  $(P_y)_3$ , and  $(P_y)_4$ . The values of these proportions for the period 1962-68 are shown in Table 4-22. As in the case of  $(P_r)_1$  we observe in Table 4-22 that the proportions  $(P_y)_i$  have moved systematically over time and, therefore, can be easily predicted beyond the sample period from the equations (4-69), (4-70) and (4-71).

Table 4-22 — Proportion of Assessed Income in the  $i$ th Income Class, 1962-68

Year	$(P_y)_1$	$(P_y)_2$	$(P_y)_3$	$(P_y)_4$
1962	0.133	0.333	0.376	0.158
1963	0.132	0.317	0.390	0.161
1964	0.118	0.287	0.422	0.173
1965	0.108	0.255	0.450	0.187
1966	0.096	0.228	0.468	0.208
1967	0.084	0.202	0.478	0.236
1968	0.073	0.171	0.487	0.269

$$(P_y)_2 = 0.36686 - 0.02768 t \quad (4-69)$$

(0.00350)      (0.00078)

$$1962-68 \quad \bar{R}^2 = 0.9952$$

$$DW = 2.0329 \quad VN = 2.3718$$

<sup>7</sup>Assessed income specified as a function of current personal income leads to the following OLS estimate

$$Y_a = -3920.25 + 1.13615 Y_p$$

(321.027)      (0.02189)

$$\bar{R}^2 = 0.9998 \quad VN = 3.3124$$



$$(P_y)_3 = 0.35943 + 0.01982 t \quad (4-70)$$

$$(0.00797) (0.00178)$$

$$1962-68 \quad \bar{R}^2 = 0.9534$$

$$DW = 1.0482 \quad VN = 1.2223$$

$$(P_y)_4 = 0.12486 + 0.01850 t \quad (4-71)$$

$$(0.01008) (0.00225)$$

$$1962-68 \quad \bar{R}^2 = 0.9170$$

$$DW = 0.8562 \quad VN = 0.9989$$

Total tax exemptions and deductions claimed by Ontario taxpayers are determined stochastically from the estimated equation (4-17). This can be broken down by income class using identities (3-38) and (3-39). The proportions of tax exemptions and deductions in the four income classes for the period 1962-68 are given in Table 4-23.

Table 4-23 — Proportion of Tax Exemptions and Deductions in the *i*th Income Class, 1962-68

Year	(P <sub>x</sub> ) <sub>1</sub>	(P <sub>x</sub> ) <sub>2</sub>	(P <sub>x</sub> ) <sub>3</sub>	(P <sub>x</sub> ) <sub>4</sub>
1962	0.189	0.389	0.343	0.074
1963	0.190	0.368	0.364	0.078
1964	0.175	0.336	0.402	0.087
1965	0.165	0.300	0.435	0.100
1966	0.156	0.269	0.457	0.118
1967	0.143	0.241	0.472	0.144
1968	0.134	0.211	0.483	0.172

These proportions can be forecast on the basis of the following equations:

$$(P_x)_2 = 0.42414 - 0.03054 t \quad (4-72)$$

$$(0.00312) (0.00070)$$

$$1962-68 \quad \bar{R}^2 = 0.9969$$

$$DW = 1.9107 \quad VN = 2.2292$$

$$(P_x)_3 = 0.32643 + 0.02414 t \quad (4-73)$$

$$(0.00868) (0.00194)$$

$$1962-68 \quad \bar{R}^2 = 0.9624$$

$$DW = 1.1332 \quad VN = 1.3221$$

$$(P_x)_4 = 0.04514 + 0.01632 t \quad (4-74)$$

$$(0.00889) (0.00199)$$

$$1962-68 \quad \bar{R}^2 = 0.9172$$

$$DW = 0.8128 \quad VN = 0.9483$$

The weighted average basic tax rate ( $W_r$ )<sub>*i*</sub> for the *i*th income class is defined in identity (3-35). These rates computed from taxation statistics for the period 1962-68 are given in Table 4-24.

Table 4-24 — Weighted Average Basic Tax Rates of the *i*th Income Class, 1962-68

Year	(W <sub>r</sub> ) <sub>1</sub>	(W <sub>r</sub> ) <sub>2</sub>	(W <sub>r</sub> ) <sub>3</sub>	(W <sub>r</sub> ) <sub>4</sub>
1962	0.11119	0.12565	0.15234	0.27780
1963	0.11200	0.12711	0.15322	0.27559
1964	0.11238	0.12809	0.15337	0.27743
1965	0.11229	0.12906	0.15588	0.27585
1966	0.11241	0.12992	0.15961	0.27267
1967	0.11231	0.13067	0.15945	0.27035
1968	0.11284	0.13138	0.16271	0.26909

Using the average tax rates of Table 4-24 and identities (3-33) and (3-34) we derive personal income tax accruals,  $T_p^*$  which serves as an explanatory variable in equation (4-15) for personal income taxes. The estimated coefficient of  $T_p^*$  is greater than unity in accordance with *a priori* expectations.

#### 4.21 The Estimated Equations for Corporate Taxes

Equations (4-19) and (4-20) explain corporate direct taxes and corporate taxable income respectively. These equations were estimated by OLS for the period 1958-67 since the 1968 observation on  $Y_c$  was not available at the time of estimation.<sup>8</sup>

#### 4.22 The Equation for Gasoline Taxes

The gasoline tax is explained by equation (4-21). The degree of explanation is exceptionally good and the estimated parameter is highly significant.

#### 4.23 The Equation for Retail Sales Taxes

Equation (4-22) for retail sales taxes was estimated for the period 1961-68 since the tax was initially introduced in Ontario in 1961. The estimated coefficient of  $T_s^*$  is less than one as anticipated on *a priori* reasoning.

#### 4.24 The Equation for Hospital Insurance Premiums

This revenue component is determined by equation (4-23) which was estimated for the period 1959-68. The resulting coefficient is significant and less than unity, whereas the value of  $\bar{R}^2$  is quite good.

#### 4.25 Motor Vehicle Licences and Permits

The estimated equation (4-24) for  $V_m$  was derived from (4-39) after a transformation of variables to eliminate first-order autocorrela-

tion in the residuals. Although the coefficient of  $V_r$  has approximately the same value the constant term has been significantly reduced in (4-24) relative to (4-39). For forecasting purposes equation (4-39) might be preferred in view of its higher  $\bar{R}^2$ .

#### 4.26 Profits of Liquor Commissions

The variable  $P_b$  is explained in equation (4-25) in terms of per capita personal income. An alternative specification was tested with the number of adult population,  $N_p$ , as an explanatory variable, with the result

$$P_b = -151.817 + 0.05849 N_p \quad (4-75)$$

$$(17.0744) (0.00477)$$

$$1947-68 \quad \bar{R}^2 = 0.8767$$

$$DW = 0.1844 \quad VN = 0.1932$$

The coefficients are highly significant but the DW value is very poor. An attempt to introduce both  $N_p$  and  $Y_p$  into the regression produced unacceptable results with a negative estimated parameter for  $N_p$ .

#### 4.27 The Estimated Equation for Other Indirect Taxes

The variable for other indirect taxes has been specified as a function of  $C_p$  which is endogenous to the model. For this reason, the equation for  $T_o$  was estimated by OLS (4-26) as well as by TSLS (4-34). The numerical estimates are quite similar in these equations.

#### 4.28 The Equation for Government Investment Income

Finally, government investment income  $Y_g$  is determined by equation (4-27) with provincial government expenditure as an explanatory variable. The equation fails the DW test but stands up to the VN test at the one per cent level of significance.

### CONCLUDING REMARKS

In this study we have presented a 47-equation econometric model for the Ontario economy which can be used for policy analysis and forecasting purposes.

The model permits the evaluation of policies relating to a proposed change in any of the tax rates and other instrument variables by tracing the chain reactions resulting from such a change on the entire model. Eventually, the policy evaluation feature of the model will be greatly enhanced with the simulation of its structure in the computer and the computation of its impact multipliers.

<sup>8</sup>In equation (4-20)  $Y_c$  can alternatively be specified in terms of current profits yielding the equation

$$Y_c = 511.671 + 0.56223 P_c$$

$$(63.9508) (0.02841)$$

$$\bar{R}^2 = 0.9775 \quad VN = 2.7091$$



With respect to forecasting it must be emphasized that the model has a considerable degree of flexibility and can be collapsed to a smaller size depending on the requirements of a particular analyst. For example, if the analyst is only interested in forecasting GPP and its major components he can select from the variety of results seven statistical relationships explaining the components and the GPP identity. If his interest lies in the determination of personal income he will select the personal income identity and four statistical equations for the components. If he wishes to forecast any of the government revenue

components, such as personal income taxes, corporate taxes, etc., he can use the sub-model pertaining to that component, and so on. A collapsed version of the model aimed at forecasting, currently under development in the Economic Analysis Branch will appear in a forthcoming issue of the *Ontario Economic Review*.

While discussing our results of regression analysis we pointed out the merits and demerits of each individual relationship on the basis of statistical and economic criteria. These relationships must be looked upon as integral parts of the model, therefore, their

validity depends on the performance of the model as a whole. In the final analysis the overall evaluation of the model can only be based upon its ability to provide reliable answers to complex questions relating to forecasting and economic policy.

In conclusion, the design of an econometric model is a continuing process involving constant updating, modification and improvement of its structure as more statistical and other information becomes available. Thus the present model should not be considered as a final product but as a first approximation of the Ontario economic system.



### SPECIFICATION ERRORS IN ECONOMETRICS

When we discussed the foreign trade equations of the Ontario model we indicated that because of lack of data on price indexes the price variable was omitted. This introduces a specification error since we know the correct hypothesis but because of lack of appropriate information we proceed to estimate on the basis of an incorrect hypothesis.

It is interesting to know whether there is a relationship between the coefficients of the correct and incorrect specification in order to obtain a measure of the bias introduced by using the latter. Such a relationship has been established by H. Theil<sup>1</sup>.

Let us assume that the following hypothesis is correct

$$Y = X\beta + u \quad (A-1)$$

where  $Y$  is an  $n \times 1$  vector of observations on the dependent variable

$X$  is an  $n \times k$  matrix of observations on the explanatory variables

$\beta$  is a  $k \times 1$  vector of the unknown parameters

$u$  is an  $n \times 1$  vector of unobserved disturbances.

Suppose further that the following assumptions of the model hold:

$$E(u) = 0$$

$$E(uu') = \sigma^2 I$$

$X$  is a set of non-stochastic elements

$X$  has rank  $k < n$ .

Given this hypothesis the best linear unbiased estimator of  $\beta$  is given by

$$\hat{\beta} = (X'X)^{-1} X'Y \quad (A-2)$$

Suppose now that because we are ignorant of the correct hypothesis, or because we attempt to overcome multicollinearity problems, we do not use  $X$  as the matrix of explanatory variables but a different matrix  $X_x$  of order  $n \times r$ , where  $r < k$ , so that  $k - r$  explanatory variables are omitted from the regression.

This incorrect specification amounts to replacing (A-1) by

$$Y = X_x \beta_x + u_x \quad (A-3)$$

Subtracting (A-3) from (A-1) we obtain

$$X\beta - X_x \beta_x + u - u_x = 0$$

Thus  $u_x = X\beta - X_x \beta_x + u$

and  $E(u_x) = X\beta - X_x \beta_x \neq 0$

Since  $E(u) = 0$  and  $X_x$  is assumed to be fixed.

In general the expected value of  $u_x$  will be different from zero, regardless of the  $\beta_x$ 's.

Let us assume that we apply least-squares to (A-3) and obtain the result

$$\hat{\beta}_x = (X'_x X_x)^{-1} X'_x Y \quad (A-4)$$

This result is not of great value to us unless we can establish a relation between  $\hat{\beta}_x$  and  $\hat{\beta}$ , i.e. if we know  $\hat{\beta}_x$  we can make an inference about  $\hat{\beta}$ .

Substituting (A-1) into (A-4) we have

$$\hat{\beta}_x = (X'_x X_x)^{-1} X'_x (X\beta + u)$$

$$= (X'_x X_x)^{-1} X'_x X\beta$$

$$+ (X'_x X_x)^{-1} X'_x u$$

$$\therefore E(\hat{\beta}_x) = (X'_x X_x)^{-1} X'_x X\beta$$

$$= D\beta \quad (A-5)$$

$$\text{where } D = (X'_x X_x)^{-1} X'_x X \quad (A-6)$$

From (A-5) we can state that  $\hat{\beta}_x$  is an unbiased estimator of  $D\beta$  and, therefore, knowing  $D$  we can use  $\hat{\beta}_x$  as an estimator of  $\beta$ .

Equation (A-6) implies that  $D$  is obtained from the regressions

$$X = X_x D + \text{vector of residuals} \quad (A-7)$$

where  $X = [X_1 X_2 \dots X_k]$

and  $X_x = [X_1 X_2 \dots X_r]$

with  $r < k$  and hence  $X_{r+1}, X_{r+2}, \dots, X_k$  are the variables omitted from the regression.

The matrix  $D$  is of order  $r \times k$ . The first  $r$  columns of  $D$  form an identity matrix of order  $r \times r$ , since the first  $r$  columns of  $X$  form  $X_x$ , and therefore

$$D_{r,r} = (X'_x X_x)^{-1} X'_x X_x = I$$

Hence,

$$D = (X'_x X_x)^{-1} X'_x X$$

$$= \begin{bmatrix} 1 & 0 & \dots & 0 & d_{1,r+1} & \dots & d_{1k} \\ 0 & 1 & \dots & 0 & d_{2,r+1} & \dots & d_{2k} \\ \vdots & \vdots & \ddots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & 1 & d_{r,r+1} & \dots & d_{rk} \end{bmatrix} \quad (A-8)$$

where the  $d_{ij}$  are elements of the  $D$  matrix.

$$\therefore E(\hat{\beta}_x) = D\beta$$

$$= \begin{bmatrix} 1 & 0 & \dots & 0 & d_{1,r+1} & \dots & d_{1k} \\ 0 & 1 & \dots & 0 & d_{2,r+1} & \dots & d_{2k} \\ \vdots & \vdots & \ddots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & 1 & d_{r,r+1} & \dots & d_{rk} \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \end{bmatrix}$$

$$= \beta_1 + (d_{1,r+1} \beta_{r+1} + \dots + d_{1k} \beta_k) \quad (A-9)$$

$$\text{and } E(\hat{\beta}_x) - \beta_1 = d_{1,r+1} \beta_{r+1}$$

$$+ \dots + d_{1k} \beta_k \quad (A-10)$$

Equation (A-9) defines the relation between the estimator  $\hat{\beta}_x$  of the incorrect specification and the parameter  $\beta$  of the correct one, whereas equation (A-10) defines the specification bias of the estimator  $\hat{\beta}_x$ .

<sup>1</sup>H. Theil, "Specification Errors and the Estimation of Economic Relationships", Review of the International Statistical Institute, XXV (1957), pp. 41-51.



LEAST-SQUARES BIAS AND INCONSISTENCY IN SIMULTANEOUS-EQUATION ESTIMATION

The first point to notice in simultaneous-equation estimation is that it is very likely to obtain biased and inconsistent estimates of the parameters of a simultaneous model if we employ the single-equation least-squares method of estimation, i.e., if we apply OLS to the structural equations one by one.

This is the well-known Haavelmo's proposition<sup>1</sup>, which states that if we have a relationship of the form

Y<sub>1t</sub> = f (Y<sub>2t</sub>, Y<sub>3t</sub>, X<sub>1t</sub>, X<sub>2t</sub> . . . . u<sub>1t</sub>) (B-1)

where the Y's are endogenous and the X's are exogenous variables, and if we have other relationships in the model then simultaneous fulfilment implies that the disturbance term, u<sub>1t</sub>, is dependent upon the endogenous variables on the right-hand side of equation (B-1). To demonstrate this problem consider the simplest possible simultaneous model

C<sub>t</sub> = α + βY<sub>t</sub> + u<sub>t</sub> (B-2)

Y<sub>t</sub> = C<sub>t</sub> + Z<sub>t</sub> (B-3)

It is assumed that Z<sub>t</sub> is the only exogenous variable in this model and that the random disturbance term has the following properties:

E (u<sub>t</sub>) = 0 for all t (B-4)

E (u<sub>t</sub>u<sub>t+s</sub>) = { 0 for s ≠ 0  
σ<sup>2</sup> for s = 0 (B-5)

Substituting (B-2) into (B-3) and rearranging yields

Y<sub>t</sub> = α / (1-β) + 1 / (1-β) Z<sub>t</sub> + 1 / (1-β) u<sub>t</sub>

Hence,

E (Y<sub>t</sub>) = α / (1-β) + 1 / (1-β) Z<sub>t</sub>

and Y<sub>t</sub> - E (Y<sub>t</sub>) = 1 / (1-β) u<sub>t</sub> (B-6)

First, we consider the covariance of u<sub>t</sub> and Y<sub>t</sub>, which is by definition

Cov (u<sub>t</sub>Y<sub>t</sub>) = E {u<sub>t</sub> [Y<sub>t</sub> - E (Y<sub>t</sub>)]}  
= σ<sup>2</sup><sub>u</sub> / (1-β) ≠ 0 (B-7)

In view of (B-7) we conclude that u<sub>t</sub> and Y<sub>t</sub> are not independent, because their covariance does not vanish.

Next, we prove that due to the dependence between u<sub>t</sub> and Y<sub>t</sub> if we apply OLS to

equation (B-2) we will obtain biased and inconsistent estimates  $\hat{\alpha}$  and  $\hat{\beta}$  of the true parameters  $\alpha$  and  $\beta$  respectively. Let us sum (B-2) over all values and divide by the sample size to obtain

$\bar{C} = \alpha + \beta \bar{Y}$  (B-8)

Subtracting (B-8) from (B-2) gives

c<sub>t</sub> = βy<sub>t</sub> + u<sub>t</sub> (B-9)

where c<sub>t</sub> = C<sub>t</sub> -  $\bar{C}$  and y<sub>t</sub> = Y<sub>t</sub> -  $\bar{Y}$

Applying OLS to equation (B-9) we obtain an estimate  $\hat{\beta}$  of the parameter  $\beta$

$\hat{\beta} = \frac{\sum y_t c_t}{\sum y_t^2}$  (B-10)

We have shown, however, that there is a stochastic connection between u<sub>t</sub> and y<sub>t</sub> in (B-9), i.e.,

u<sub>t</sub> = γy<sub>t</sub> + e<sub>t</sub> (B-11)

where E (e<sub>t</sub>) = 0 for all t.

Substituting (B-11) into (B-9) yields

c<sub>t</sub> = (β + γ) y<sub>t</sub> + e<sub>t</sub> (B-12)

If we multiply (B-12) through by y<sub>t</sub> and sum over all values we obtain

∑ y<sub>t</sub>c<sub>t</sub> = (β + γ) ∑ y<sub>t</sub><sup>2</sup> + ∑ y<sub>t</sub>e<sub>t</sub> (B-13)

Substituting (B-13) into (B-10) we can write

$\hat{\beta} = \beta + \gamma + \frac{\sum y_t e_t}{\sum y_t^2}$  (B-14)

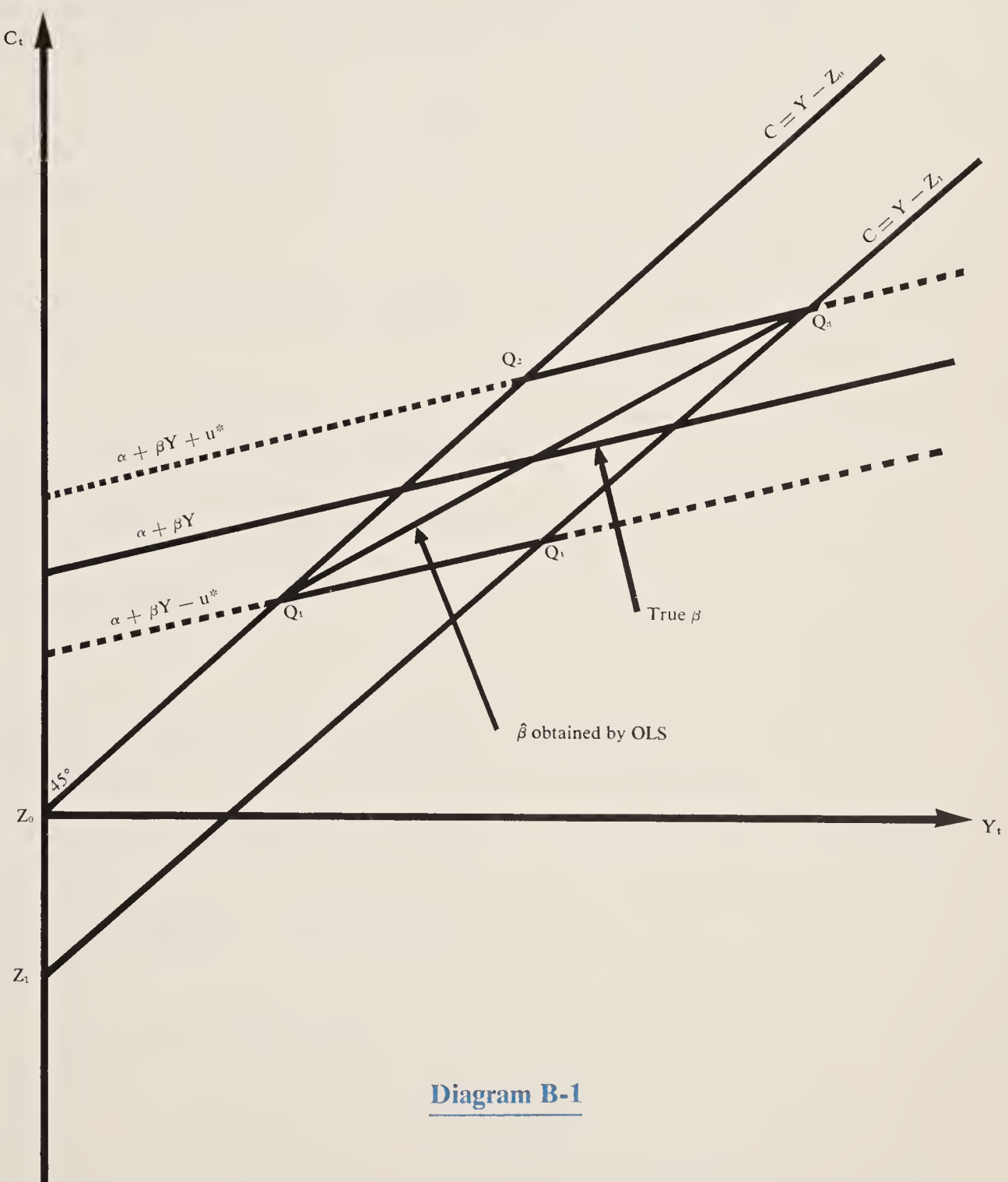


Diagram B-1

<sup>1</sup>T. Haavelmo, "The Statistical Implications of a System of Simultaneous Equations", *Econometrica*, II (January 1943).



Taking expected values in (B-14) we obtain

$$E(\hat{\beta}) = \beta + \gamma \quad (\text{B-15})$$

From (B-15) we conclude that  $\hat{\beta}$  is a biased estimator of the parameter  $\beta$ .

Taking probability limits in (B-14) we have

$$\text{Plim}(\hat{\beta}) = \beta + \gamma \quad (\text{B-16})$$

since in the limit  $\sum y_t e_t / \sum y_t^2 = 0$  because  $y_t$  and  $e_t$  are independent.

From (B-16) we conclude that  $\hat{\beta}$  is an inconsistent estimator of the parameter  $\beta$ , that is, the bias does not disappear even if we take infinitely large samples.

An alternative way of demonstrating the bias and inconsistency of OLS estimates in simultaneous-equation models is by using graphical methods as in Diagram B-1. We assume that the disturbance term in the

stochastic equation (B-2) is homoscedastic, that is, it has a constant variance between  $+u^*$  and  $-u^*$ . We also assume two arbitrary values  $Z_0$  and  $Z_1$  for the exogenous variable  $Z_t$  in identity (B-3). The equation lines in the Diagram are, thus, intersected by the identity lines. There are four possible equilibrium points depending on the values assumed by  $Z_t$  and  $u_t$ , as follows:

1. If  $Z_t = Z_0$  and  $u_t = -u^*$   
the equilibrium point is  $Q_1$
2. If  $Z_t = Z_0$  and  $u_t = u^*$   
the equilibrium point is  $Q_2$
3. If  $Z_t = Z_1$  and  $u_t = u^*$   
the equilibrium point is  $Q_3$
4. If  $Z_t = Z_1$  and  $u_t = -u^*$   
the equilibrium point is  $Q_4$

Note that all observations will lie in the parallelogram  $Q_1Q_2Q_3Q_4$ . If we fit a least-squares regression line  $Q_1Q_3$  to the observations, we minimize the sum of squared residuals in the vertical direction and, hence, the least-squares line is tilted counter-clockwise relative to the true line  $\alpha + \beta Y$ , because of the pull of extreme points, which lie near the corners  $Q_1$  and  $Q_3$  of the parallelogram. The least-squares procedure, therefore, will overestimate the slope  $\beta$  and underestimate the intercept  $\alpha$  of the true line.

The conclusion from this analysis is that, in general, the single-equation least-squares method is not appropriate for estimating the equations of a simultaneous-equation model. This has led to the development of other estimation methods, such as, the two stage least-squares method, which remove the inconsistency of the estimates.



## THE TWO-STAGE LEAST-SQUARES METHOD OF ESTIMATION

Appendix B has demonstrated the bias and inconsistency of OLS when applied to simultaneous-equation models. To cope with this problem, Henri Theil<sup>1</sup> has developed the Two-Stage Least-Squares (TSLS) method of estimation which produces consistent and asymptotically unbiased estimates of parameters. The principle of the TSLS is quite simple. Consider the following two-equation system

$$Y_1 = f_1(Y_2, X_1, u_1) \quad (C-1)$$

$$Y_2 = f_2(Y_1, X_2, X_3, u_2) \quad (C-2)$$

where  $Y_1$  represent endogenous variables,  $X_i$  denote exogenous variables and  $u_i$  are random disturbances. Suppose we wish to estimate the parameters of the over-identified equation (C-1). Clearly, we cannot apply the OLS method because the endogenous variable,  $Y_2$  on the right-hand side of (C-1) will be correlated with the disturbance term  $u_1$ . In the TSLS method we first obtain the reduced-form of the model

$$Y_1 = F_1(X_1, X_2, X_3, v_1) \quad (C-3)$$

$$Y_2 = F_2(X_1, X_2, X_3, v_2) \quad (C-4)$$

The first stage consists of deriving an estimated series  $\hat{Y}_2$  of  $Y_2$  by applying OLS to equation (C-4). Substituting  $\hat{Y}_2$  into (C-1) we can write

$$Y_1 = f_1(\hat{Y}_2, X_1, u_1) \quad (C-5)$$

In the second stage we apply OLS to (C-5) and obtain consistent estimators since the instrument  $\hat{Y}_2$  is a linear function of the  $X_i$  which are by definition independent and, hence,  $\hat{Y}_2$  is not correlated with  $u_1$ .

We now proceed to develop the TSLS method and to prove the consistency of the TSLS estimators.

Consider the first equation of the set  $BY_t + \Gamma X_t = u_t$ , namely,

$$B_1 Y_t + \Gamma_1 X_t = u_{1t} \quad t = 1 \dots n \quad (C-6)$$

where  $B_1$  is the first row of the  $B$  matrix of coefficients attached to endogenous variables

$\Gamma_1$  is the first row of the  $\Gamma$  matrix of coefficients attached to exogenous variables

$Y_t$  is a column vector of  $g$  endogenous variables

$X_t$  is a column vector of  $k$  exogenous variables, and

$u_{1t}$  is a vector of disturbances.

Let the symbols  $\Delta$  and  $x$  denote respectively endogenous included and exogenous included variables or parameters. Then using the *a priori* restrictions on the coefficients of (C-6) we can write this equation as

$$Y_{1t} = \beta_{12} Y_{2t} + \dots + \beta_{1g} \Delta Y_{gt} + \gamma_{1t} X_{1t} + \dots + \gamma_{1kx} X_{kxt} + u_{1t} \quad (C-7)$$

Equation (C-7) has been normalized by setting  $\beta_{11} = 1$ . Note that for  $t = 1 \dots n$ , (C-7) is a set of equations which may be written in matrix form as

$$\begin{bmatrix} Y_{11} \\ \vdots \\ Y_{1n} \end{bmatrix} = \begin{bmatrix} Y_{21} \dots Y_{g1} \\ \vdots \\ Y_{2n} \dots Y_{gn} \end{bmatrix} \begin{bmatrix} \beta_{12} \\ \vdots \\ \beta_{1g} \end{bmatrix} + \begin{bmatrix} X_{11} \dots X_{kx1} \\ \vdots \\ X_{1n} \dots X_{kxn} \end{bmatrix} \begin{bmatrix} \gamma_{11} \\ \vdots \\ \gamma_{1kx} \end{bmatrix} + \begin{bmatrix} u_{11} \\ \vdots \\ u_{1n} \end{bmatrix}$$

$$\text{or } Y_1 = Y_2 \beta'_2 + X_x \gamma'_{1x} + u_1 \quad (C-8)$$

The procedure of the TSLS method is as follows:

STAGE I. Regress each variable in  $Y_2$  on the complete set of all exogenous variables, that is on

$$X = [X_x \ X_{xx}]$$

where  $X_x$  denotes the exogenous variables included in the equation and  $X_{xx}$  denotes the exogenous variables excluded from the equation. This regression implies that we use the following relationship

$$Y_2 = X\beta + e \quad (C-9)$$

where  $e$  represents a vector of least-squares residuals. The regression equation of (C-9) can be written as

$$\hat{Y}_2 = X\hat{\beta} = X(X'X)^{-1}X'Y_2 \quad (C-10)$$

STAGE II. Replace  $Y_2$  in (C-8) by its estimate  $\hat{Y}_2$  and regress  $Y_1$  and  $\hat{Y}_2$  and  $X_x$ , that is,

$$Y_1 = \hat{Y}_2 \beta'_2 + X_x \gamma'_{1x} + u_1$$

$$= [\hat{Y}_2 \ X_x] \begin{bmatrix} \beta'_2 \\ \gamma'_{1x} \end{bmatrix} + u_1 \quad (C-11)$$

<sup>1</sup>H. Theil. Economic Forecasts and Policy, 2d. ed., North-Holland Publishing Company, Amsterdam, 1961. pp. 204-240, 326-355.



Application of OLS to (C-11) gives the TSLS estimators  $\hat{\beta}'_2$  and  $\hat{\gamma}'_{1x}$

$$\begin{bmatrix} \hat{\beta}'_2 \\ \hat{\gamma}'_{1x} \end{bmatrix} = \begin{bmatrix} \hat{Y}'_2 \\ X'_x \end{bmatrix} \begin{bmatrix} \hat{Y}_2 \\ X_x \end{bmatrix}^{-1} \begin{bmatrix} \hat{Y}_2 \\ X_x \end{bmatrix} Y_1 = \begin{bmatrix} \hat{Y}'_2 \hat{Y}_2 & \hat{Y}'_2 X_x \\ X'_x \hat{Y}_2 & X'_x X_x \end{bmatrix}^{-1} \begin{bmatrix} \hat{Y}'_2 Y_1 \\ X'_x Y_1 \end{bmatrix} \quad (C-12)$$

Substituting (C-10) into (C-12) we obtain the final result

$$\begin{bmatrix} \hat{\beta}'_2 \\ \hat{\gamma}'_{1x} \end{bmatrix} = \begin{bmatrix} Y_2 X (X'X)^{-1} X' Y_2 & Y'_2 X (X'X)^{-1} X' X_x \\ X'_x X (X'X)^{-1} X' Y_2 & X'_x X_x \end{bmatrix}^{-1} \begin{bmatrix} Y_2 X (X'X)^{-1} X' Y_1 \\ X'_x Y_1 \end{bmatrix} \quad (C-13)$$

Since

$$\begin{aligned} \hat{Y}'_2 \hat{Y}_2 &= [X(X'X)^{-1} X' Y_2]' X(X'X)^{-1} X' Y_2 \\ &= Y'_2 X (X'X)^{-1} X' X (X'X)^{-1} X' Y_2 \\ &= Y'_2 X (X'X)^{-1} X' Y_2 \\ \hat{Y}'_2 X_x &= [X(X'X)^{-1} X' Y_2]' X_x \\ &= Y'_2 X (X'X)^{-1} X' X_x \\ \hat{Y}'_2 Y_1 &= [X(X'X)^{-1} X' Y_2]' Y_1 \\ &= Y'_2 X (X'X)^{-1} X' Y_1 \\ \text{and } X'_x \hat{Y}_2 &= \text{transpose of } \hat{Y}'_2 X_x \\ &= X'_x X (X'X)^{-1} X' Y_2 \end{aligned}$$

The relationship (C-13) gives the TSLS estimators directly without going through the two stages described above.

To establish the consistency of the TSLS estimators, first we prove that the TSLS estimation method is equivalent to the instrumental variables estimation method which gives consistent estimators.

Consider the linear model

$$Y = X\beta + u \quad (C-14)$$

If  $\text{Plim} \left( \frac{1}{n} X'u \right) \neq 0$  then the OLS estimators will be biased and inconsistent. If we have a set of instrumental variables

$$Z = [Z_1, Z_2, \dots, Z_k]$$

and  $\text{Plim} \left( \frac{1}{n} Z'u \right) = 0$  then the instrumental variable estimator,  $b$ , is

$$\begin{aligned} b &= (Z'X)^{-1} Z'Y \\ &= (Z'X)^{-1} Z' X\beta + u \\ &= (Z'X)^{-1} Z' X\beta + (Z'X)^{-1} Z'u \\ &= \beta + (Z'X)^{-1} Z'u \\ &= \beta \text{ since } Z'u = 0 \text{ is the limit.} \end{aligned}$$

Therefore, the instrumental variable estimator,  $b$ , is consistent.

Consider next the matrix equation (C-8). In the second stage of TSLS we use  $\hat{Y}_2$  as an instrument for  $Y_2$ , and  $X_x$  as an instrument for itself, so that



$$Z = [\hat{Y}_2 \ X_x] \text{ and } X = [Y_2 \ X_x]$$

$$\begin{aligned} \therefore Z'X &= \begin{bmatrix} \hat{Y}_2' \\ X_x' \end{bmatrix} [Y_2 \ X_x] \\ &= \begin{bmatrix} \hat{Y}_2' Y_2 & \hat{Y}_2' X_x \\ X_x' Y_2 & X_x' X_x \end{bmatrix} \end{aligned} \quad (C-15)$$

$$\therefore b = (Z'X)^{-1} Z'Y$$

$$= \begin{bmatrix} \hat{Y}_2' Y_2 & \hat{Y}_2' X_x \\ X_x' Y_2 & X_x' X_x \end{bmatrix}^{-1} \begin{bmatrix} \hat{Y}_2' Y_1 \\ X_x' Y_1 \end{bmatrix} \quad (C-16)$$

It remains to show that:

- a) the instruments  $\hat{Y}_2$  and  $X_x$  are legitimate, i.e., uncorrelated in probability limit with the  $u_1$
- b) the instrumental variable estimators are identical with the TSLS estimators.

Regarding the first point we observe that

$$\text{Plim} \left( \frac{1}{n} X_x' u_1 \right) = 0$$

since by definition  $X_x$  and  $u_1$  are not correlated.

Similarly,

$$\begin{aligned} \text{Plim} \left( \frac{1}{n} \hat{Y}_2' u_1 \right) &= \text{Plim} \frac{1}{n} Y_2' X (X'X)^{-1} X' u_1 \\ &= \text{Plim} \left[ \frac{1}{n} Y_2' X (X'X)^{-1} \right] \text{Plim} \left( \frac{1}{n} X' u_1 \right) \\ &= 0 \quad \text{since } \text{Plim} \left( \frac{1}{n} X' u_1 \right) = 0 \end{aligned}$$

Regarding the second point, we compare the TSLS estimators in (C-12) with the instrumental variable estimators in (C-16). We observe that all terms are the same with the exception of the elements which form the first column in the inverse matrices.

But

$$\begin{aligned} \hat{Y}_2' Y_2 &= \hat{Y}_2' (\hat{Y}_2 + e) \\ &= \hat{Y}_2' \hat{Y}_2 + \hat{Y}_2' e \\ &= \hat{Y}_2' \hat{Y}_2 \end{aligned}$$

where  $e$  denotes a vector of OLS residuals in the regression of  $Y_2$  on  $X$  since  $\hat{Y}_2' e = 0$ , that is, the products of predicted values and residuals are identically equal to zero.

Similarly,

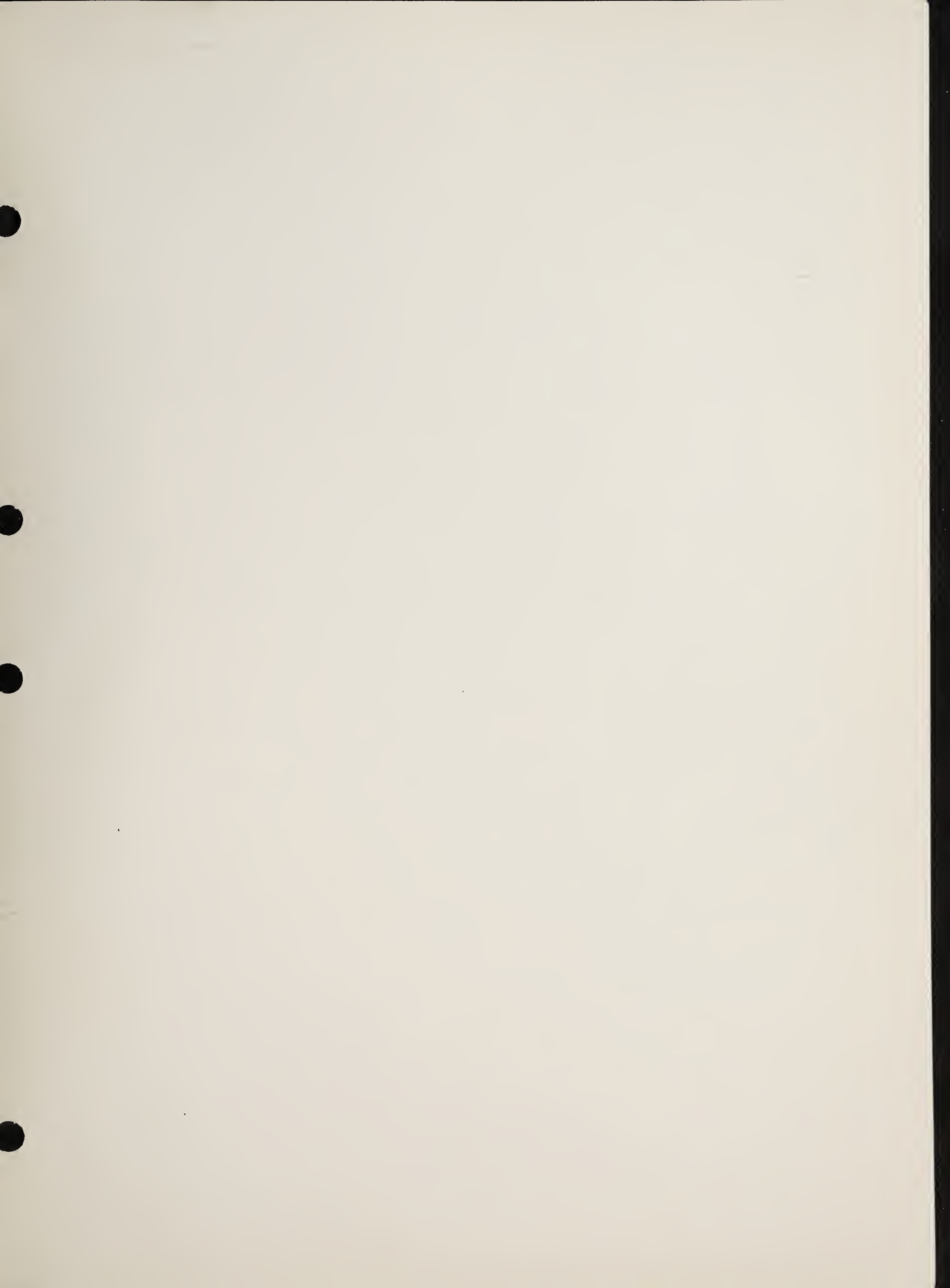
$$\begin{aligned} X_x' Y_2 &= X_x' (\hat{Y}_2 + e) \\ &= X_x' \hat{Y}_2 + X_x' e \\ &= X_x' \hat{Y}_2 \quad \text{since } X_x' e = 0 \end{aligned}$$

Hence, the TSLS estimators are equivalent to instrumental variable estimators, which have been shown to be consistent estimators.













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# Ontario Economic Review

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May/June 1971  
Volume 9, Number 3

Department of Treasury and Economics

Hon. W. Darcy McKeough, Treasurer of Ontario  
and Minister of Economics

H. Ian Macdonald, Deputy Minister

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# Ontario Economic Review

May/June 1971  
Volume 9, Number 3

## The Ontario Economy

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## An Analysis of Fertility Trends in Ontario

2

T. R. Barratt, *Demographer*  
Department of Treasury and Economics

## Selected Economic Indicators

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A publication of the  
Department of Treasury  
and Economics  
Government of Ontario

Hon. W. Darcy McKeough  
*Treasurer of Ontario and  
Minister of Economics*  
H. Ian Macdonald  
*Deputy Minister*

The *Ontario Economic Review* is prepared and edited bimonthly in the Economic Analysis Branch of the Economic and Statistical Services Division, Department of Treasury and Economics. The review presents articles of interest as well as current information on economic activity in Ontario. Signed articles reflect the opinions of their authors and do not necessarily represent the views of the Department.

Subscriptions can be obtained free of charge by writing the Editor, *Ontario Economic Review*, Department of Treasury and Economics, Frost Building, Queen's Park, Toronto 182, Ontario.

### About the Review

The feature article for the May-June edition of the *Ontario Economic Review* examines in depth the levels of fertility for the counties and regions of Ontario. Various measures of fertility are developed in order to establish a comprehensive base for the analysis and projection of population growth.

During the period 1961 to 1969 fertility in the province underwent an almost continuous decline of approximately 30 to 35 per cent. The result of this decline may be felt for generations as a reduced number of women reach the reproductive ages 15 to 20 years hence. The smaller child-bearing population will result in a slowdown in the rate of Ontario's population growth. However, recent levels of fertility for the province suggest that the protracted decline during the 1960's may be leveling off.

The article was prepared by T. R. Barratt in the Economic Analysis Branch of the Economic and Statistical Services Division, Department of Treasury and Economics.

### Indicator Charts, Pages 16-18

Fluctuations in aggregate economic activity — commonly used to define business cycles — do not necessarily correspond with fluctuations in the individual activities which make up the aggregate. Instead different indicators of economic activity may vary with respect to both their rates of growth and the timing of their peaks and troughs: some may grow more rapidly than others, some change direction sooner.

Those activities which tend to assume a direction in advance of the aggregate — because they relate to future rather than present production — are referred to as leading indicators, and are widely used to anticipate the short-run future course of the overall economy. The charts on pages 16-18 in the *Ontario Economic Review* present a number of these leading indicators, as well as several which are coincidental to or lag behind the aggregate, to provide for the reader an opportunity to make such an evaluation.

While comparisons of the timing and direction of general changes in the various indicators can readily be made, great care must be exercised in making such a comparison of the amplitude of fluctuations. Of the three vertical scales used — 'A' (arithmetic) and 'L 1' and 'L 2' (logarithmic scales with one and two cycles respectively over a given vertical distance) — only the logarithmic scales can be used to compare relative changes in different indicators. *And this applies only when all series being compared are on the same logarithmic scale.* In such a situation all parallel lines represent equal rates of growth, the exact rate of growth being determined by the slope of the line.



## Ontario Budget 1971

On April 26 Provincial Treasurer Darcy McKeough introduced the technique of "full employment budgeting" to Canada by advancing a new five per cent tax credit to encourage job-creating investment in machinery and equipment. In his first budget statement to the Ontario Parliament Mr. McKeough described the corporation income tax credit as "a powerful incentive for business expansion". He also plans to stimulate the economy with a record deficit of \$415 million, and controls on government costs to put more money in the hands of consumers and business. The Treasurer warned, however, that the Province's moves could not achieve full employment unless the federal government joined its efforts, primarily by removing the three per cent surtaxes on personal and corporation incomes.

Other budget features include:

- Deduction of interest costs from corporation income tax for Ontario businesses who buy shares in other corporations, to encourage Canadian ownership and offset the present U.S. advantage in taking over Canadian companies;
- Further large cuts in succession duties, with exemptions for widows and widowers raised from \$125,000 to \$250,000, duty free estates increased from \$50,000 to \$100,000, and surtaxes eliminated for preferred beneficiaries such as children and grandchildren. These moves will greatly assist in the continuation of family businesses and farms;
- Equalization of beer prices between northern and southern Ontario, involving an 11-cent reduction in the north and a 15-cent increase in the south on 24-bottle cases. This still leaves Ontario's beer prices the lowest in Canada;
- Elimination of fishing licence fees for Ontario residents.

Mr. McKeough also announced that, beginning April 1st, 1972, Ontario would include nursing home and home care services in its health insurance program. In the current budget year, the Province will spend an additional \$20 million to expand staff and services for mentally retarded children.

To intensify its environment programs, the Government will increase investment by \$32 million to a total of \$78 million for land acquisition for future public use and for increased spending on pollution control facilities.

The Treasurer severely criticized Ottawa's restraint policies which he estimated have cost Ontario about \$2 billion in potential growth of gross provincial product and created the highest unemployment total in Ontario in a decade. About 200,000 Ontario people are out of work according to recent DBS reports.

The projected \$415 million deficit arising from total outlays of \$4,262 million and anticipated revenues of \$3,847 million is an increase of \$300 million over last year and is scheduled to finance a variety of measures to stimulate the Ontario economy.

These include:

- \$78 million in increased property tax relief to give Ontarians more spending income, and continue the provincial-municipal tax-reform program;
- \$45 million in increased subsidies and lending programs to encourage house construction and associated employment;
- \$18 million in summer jobs for young people. This program will provide employment for 14,000 students in the various government departments and agencies during the coming summer.

Commenting on the program of expanded relief to local taxpayers, Mr. McKeough stated that the Ontario Government is "unequivocally committed to the long-run goal of increasing financial support to local governments in order to reduce the burden of financing that falls upon the property tax". The \$78 million allocated to new reform measures this year, along with a \$31 million increase in previous reforms brings the total value of Ontario's program to reduce the property tax burden to \$461 million in 1971-72.

Since 1968, the local effective tax rates have risen by only three per cent annually, compared to an average of 5.4 per cent in the period from 1960 to 1967. In 1971, the Province's support for local school costs will increase to 55 per cent, a large step toward the commitment of 60 per cent subsidization in 1972-73. Accordingly, no increase in education taxes is anticipated and only a moderate increase in municipal taxes is forecast. Mr. McKeough, who formerly served as minister of municipal affairs, promised additional tax reform measures for 1972, including consolidation and simplification of municipal grants, increased unconditional grants, and an acceleration in provincial payments to local governments.

The five per cent tax credit for investment in machinery and equipment is expected to cost \$250 million in reduced corporation income tax between 1971-73 and reflects the Government's concern over the lagging economy. DBS recently reported that machinery and equipment investment in Ontario is expected to increase only three per cent in 1971, down from 13 per cent in 1970 and 18 per cent in 1969. Moreover, manufacturing investment as a whole in Ontario is predicted to decline from \$1,173 million in 1970 to \$1,137 million in 1971.

The Ontario credit will be given for machinery and equipment purchased after budget day and put in place and used in Ontario before March 31, 1973. Companies unable to take advantage of the credit during this 23 month period will be able to carry it forward for one additional year, to April 1, 1974. The tax credit will assist in the modernization of capital stock to increase the long-run productivity of Ontario industry, and help achieve other social and economic objectives, particularly increased investment in pollution abatement equipment.

The five per cent tax credit is one of two tax incentives provided in the Ontario Budget. The second incentive permits Ontario corporations to deduct interest on money borrowed to purchase shares in other corporations.

This deduction will reduce the tax disadvantage for Ontario companies in bidding against American firms to take over other companies. Until now, American firms have enjoyed a distinct advantage because U.S. laws allow such an interest deduction to their companies. Mr. McKeough urged the federal government to make a similar move in its corporation income tax so that all companies in Canada can compete on equal terms with foreign companies.

Mr. McKeough also served notice that Ontario would protect its people against Ottawa's centralization policies and its deliberate efforts to curtail the Ontario economy.

The major priority of the Ontario budget, according to the Treasurer, was to reduce unemployment and restore economic strength. But he warned Ontario could not hope to do it alone.

"It is critical," he said, "that our actions be reinforced by the full use of the major fiscal and monetary policy instruments at the disposal of the Government of Canada."



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I – PURPOSE OF STUDY

The purpose of this study is to examine in depth the levels of fertility<sup>1</sup> for the counties<sup>2</sup>, regions and sub-regions of Ontario, with a view to providing various measures of fertility in order to establish a comprehensive base from which to analyse and project population growth. A presentation of recent and historical provincial measures of fertility is also given.

Statistics shown were, in the main, calculated by the Economic Analysis Branch, Department of Treasury and Economics, and are based on Census of Canada Reports and Ontario Vital Statistics reports. Some material, primarily at the provincial level, was taken directly from these sources, as well as from DBS Vital Statistics publications.

It should be pointed out that statistics shown for other than census years are based on population estimates and not actual counts.

II – MEASURES TO BE USED

Six measures of fertility have been used in this study:

- 1. Crude Birth Rate
- 2. General Fertility Rate
- 3. Age Specific Birth Rates
- 4. Total Fertility Rate
- 5. Gross Reproduction Rate
- 6. Child/Woman Ratio

In addition to the above: a fertility index based on the provincial rate for the given year has been calculated for the county, region and sub-region rates for the years 1961-1969; and the 54 counties (and districts) have been ranked according to each separate fertility rate (except age specific).

Crude Birth Rate

The crude birth rate is the most commonly quoted measure of fertility, and one of the easiest to calculate. It is merely the number of births in a population during a given year divided by that population (and usually multiplied by 1000). Accordingly, if a crude rate is 25 it means that there were 25 births for every 1000 people in the population. While crude birth rates are good indications of how fast a population is adding to itself by births, they are sometimes misleading when used as a basis for drawing conclusions about the actual level of fertility (in light of the poten-

tials for fertility). The crude rate can be affected as much by changes in the age and sex distribution of the population as by changes in fertility patterns. Similarly it can be misleading to compare the crude rates of different populations since differences may be due merely to differences in the sex and age structure of the populations.

In addition, large numbers of persons often migrate, forming unique groups which have withdrawn from one population and been introduced into another. Since migrants are predominantly young adults, their movements tend to decrease the crude rate in the place of origin and increase the rate in the destination.

General Fertility Rate

Because the crude rate is computed on the basis of the total population it is possible to improve upon it by adopting a more accurate base. In computing birth rates, it should be remembered that only women bear children and therefore men should be dropped from the denominator of the crude calculation. Furthermore, only females between certain ages bear children. The childbearing age for females is generally considered to be 15-49.<sup>3</sup>

The crude rate ( $\frac{\text{births per year} \times 1000}{\text{total population}}$ ) then becomes the general fertility rate ( $\frac{\text{births per year} \times 1000}{\text{females 15-49}}$ ).

A general fertility rate of 105 means that there were 105 births during the year for every 1000 females in the age group 15-49.

The general fertility rate is a more accurate measure of fertility than the crude birth rate since it is not affected by differences in sex ratios, and is less affected by differences in age structure.

Table I – Selected County Rates, 1966

County	Crude Birth Rate	General Fertility Rate
Prince Edward	18.1	86.8
Stormont	18.1	80.2
Welland	18.1	76.5

From Table I it can be seen that the three counties, Prince Edward, Stormont and Welland had identical crude birth rates in 1966. However, when the general fertility rates are compared it is apparent that wide differences exist.

The effects of removing extraneous elements from the crude rate can be observed in Table II.

Removing males from the denominator results in a spread of 0.6 among the rates, with Prince Edward being the highest and Stormont the lowest. When females 0-14 were also removed a spread of 1.2 resulted with Stormont now being the highest and Welland the lowest. When the final extraneous element (females 50+) was removed a spread of 10.3 resulted among the rates with Prince Edward now being the highest and Welland the lowest.

It appears, therefore, that when both the crude birth rate and the general fertility rate are available, the general rate can be taken as a more accurate single number measure of fertility.

Age Specific Rates

Although the general fertility rate is an improvement over the crude rate, it too can be affected by age distribution (in this case, the age distribution of females aged 15-49), since fertility is not evenly distributed across

Table II – Selected County Rates (with adjustments), 1966

County	Crude Birth Rate	Males Removed	Males and Females 0-14 Removed	Males, Females 0-14 and Females 50+ Removed
Prince Edward	18.1	36.4	53.2	86.8
Stormont	18.1	35.8	54.0	80.2
Welland	18.1	36.3	52.8	76.5

<sup>1</sup>In this study fertility refers to the rates at which children are born; fecundity is the term which refers to the ability to bear children.  
<sup>2</sup>Northern Ontario, and part of Central Ontario are divided into districts, not counties. However,

for the statistics used and conclusions shown in this paper, no distinction has been made between the two entities. The term "counties of Ontario" will refer to both the counties and the districts of Ontario. When referred to

individually, however, districts will be designated as such.  
<sup>3</sup>Females aged 15-44 are sometimes used instead of females 15-49.



**Table III – Selected Fertility Measures, 1966**

County	General Fertility Rate	Age Specific Rates						
		15-19	20-24	25-29	30-34	35-39	40-44	45-49
Carleton	72.9	39.6	147.2	153.0	102.6	54.3	14.6	1.0
Hastings	72.9	51.5	168.6	152.6	90.4	52.8	14.9	1.1

this segment of female ages. For this reason the general fertility rate is not adequate for a detailed examination of fertility patterns.

When detailed examinations of fertility are desired, age specific rates are preferable. Age specific rates measure the level of fertility at single years of age between 15 and 49. Because these rates would entail 35 separate measures of fertility (one for each age) the rates are usually combined into five-year age groups. This results in seven measures of fertility for a given population.

Age specific rates are calculated by dividing the births to the women in a given age group, by the number of women in that age group (and usually multiplying by 1000), i.e. the rate for ages 15-19 =

$$\frac{\text{births to females aged 15-19}}{\text{No. of females aged 15-19}} \times 1000.$$

From Table III it can be observed that although Carleton and Hastings counties have the same general fertility rates, the patterns of fertility are somewhat different. Hastings county has higher rates of fertility in the younger age groups while in the intermediate age groups Carleton's rates are higher. It is essential, if accurate analysis of fertility trends are to be made, that the effects of age distribution on the rates studied, be eliminated. The age specific rates succeed in eliminating most age distribution effects.

### Total Fertility Rate

Although the age specific rates offer a clear picture of fertility for a given population, frequently a single rate for the entire population is advantageous. While the general fertility rate offers a single estimate of fertility, it can be affected by the age distribution of the population. A disproportionate number of females aged 30-45 will tend to lower the rate, while a disproportionate number aged 15-30 will tend to increase the rate. The total fertility rate, however, offers a single indication of fertility unaffected by the age distribution of the population. The total fertility rate is the sum of the age specific rates and therefore eliminates the age distribution bias. The two hypothetical counties in Table IV illustrate this point.

As can be seen in Table IV counties 1 and 2 have identical populations of females, and identical age specific birth rates. The only difference between the two is the age distribution of the population.

The total fertility rates are identical, reflecting the similar fertility levels of the two counties, regardless of the differing age distributions. The general fertility rates however, are somewhat different, resulting not from differences in fertility, but from differences in age distribution. The higher proportions of females in the higher age groups have caused the total number of births to be lower,

even though the rates of birth in each age group are identical. As would seem appropriate from the above example, the total fertility rate is generally considered to be the most accurate single number indicator of pure fertility. The general fertility rate, on the other hand, is useful as an indicator of the net interaction between fertility and the age distribution of a given population of women in the child-bearing years.

### Gross Reproduction Rate

The gross reproduction rate is defined as "female births per woman (or per 1000 women). The gross reproduction rate =  $\frac{\text{total fertility rate} \times \text{female births}}{\text{total births}}$ . This rate

is actually a measure of replacement. That is, it measures how many female children a given group of women bear during a given year. The rate tends to be a little less than half of the total fertility rate, since female births usually represent just less than 50 per cent of all births. A gross reproduction rate of one (or 1000)<sup>4</sup> means that women are bearing exactly enough daughters to replace themselves (if mortality is disregarded). In 1966 county gross reproduction rates ranged from a high of 2392 in Manitoulin to a low of 1171 in Muskoka. The gross reproduction rate is merely a total fertility rate for female children.

### Child-Woman Ratio

The child-woman ratio is an indirect measure of the incidence of childbearing in a population of adult women. Specifically, it is the ratio of the number of children under five years of age to the number of women of childbearing age (15-49). The child-woman ratio is usually used where there is no adequate registration of births. The ratio does not directly refer to the number of births, but rather to the census population aged 0-4. If enumerated correctly, these children are the survivors of births during the prior five-year period. The ratio, therefore, is not a precise index of fertility since it is derived from a group of survivors rather than from the number of actual births. The index unavoidably includes the effect of infant and childhood mortality. Furthermore, the age group 0-4 is one of the least reliable portions of the enumerated population. Therefore, absolute values of this ratio do not have great significance. The ratio is at best a relative index of

**Table IV – Hypothetical County Rates**

County		15-19	20-24	25-29	30-34	35-39	40-44	45-49	Total	Total Fert. Rate	Gen. Fert. Rate
1	Females	1000	1000	1000	1000	1000	1000	1000	7000		
	Births	50	200	150	100	50	15	5	570		
	Rate	50	200	150	100	50	15	5		2850 <sup>1</sup>	81.4
2	Females	800	800	900	900	1200	1200	1200	7000		
	Births	40	160	135	90	60	18	6	509		
	Rate	50	200	150	100	50	15	5		2850 <sup>1</sup>	72.7

<sup>1</sup>Because the age specific rates are based on five-year age groups, the sum of the rates is multiplied by five to give the total fertility rate.

<sup>4</sup>In this study the gross reproduction rates are "per 1000".



fertility for sections of a homogeneous population. It should be remembered further that this is a five-year index. That is, it measures the average fertility over the past five years. Therefore, large changes in fertility over a one-year period will have a significantly decreased effect on the ratio. These disadvantages of the child-woman ratio make it less desirable as a measure of fertility.

Additional Measures

a) Indexes

An index has been calculated for the following county, region and sub-region rates for the years 1961-1969<sup>5</sup>:

- (i) Crude birth rates
- (ii) General fertility rates
- (iii) Total fertility rates
- (iv) Gross reproduction rates
- (v) Child-woman ratios

The index is based on the Ontario provincial rate for the given year. The Ontario ratio will equal 100. Therefore:

index = (county rate / provincial rate) × 100.

(because the ratio is multiplied by 100, the index can be used as a percentage of the Ontario rate)

The index allows a careful examination of how each county rate compares with the provincial rate for each year of the observation period. Furthermore, it will make county rates more readily comparable among themselves, since they will all have a common base. From Table V, for example, it can be seen that Peterborough County has a general fertility rate about seven per cent lower than the provincial rate, while Prince Edward County has a rate approximately eight per cent above the provincial rate. Furthermore, the total fertility rate for Peterborough is less than two per cent below the provincial rate while the Prince Edward rate is almost 13

Table VI – Fertility Rate Rankings – Kenora 1961 to 1964

Year	Crude Rate	General Fertility Rate	Total Fertility Rate	Gross Reproduction Rate	Child/Woman Ratio
1961	1	1	2	2	3
1962	1	1	1	1	3
1963	1	1	3	2	2
1964	1	1	1	4	2

Table VII – Crude Birth Rates and Total Fertility Rates, Ontario, Selected Years 1921-1969

Year	Crude Birth Rate	Per Cent Change	Total Fert. Rate	Per Cent Change
1921	25.3		3221	
1926	21.4	— 15.4	2727	— 15.3
1931	20.2	— 5.6	2648	— 2.9
1936	17.3	— 14.4	2217	— 15.8
1941	19.1	+ 10.4	2402	+ 7.8
1946	23.8	+ 24.6	2968	+ 23.7
1951	25.0	+ 5.0	3223	+ 8.5
1956	26.6	+ 6.4	3657	+ 13.5
1961	25.3	— 4.9	3742	+ 2.3
1966	19.0	— 24.9	2790	— 25.4
1969	17.5	— 7.9	2411	— 13.6

per cent above the province's rate. Thus, not only a clearer picture is given concerning the relative fertility of the two counties, but an indication of the relationship between the general fertility rate and the total fertility rate can be observed. It should be remembered, however, that while the indexes are excellent indicators of relative fertility levels, they are not mathematically pure, since in their calculation, the numerator (county rates) and the denominator (Ontario rates) are not

mutually exclusive. For this reason, care should be taken in the use of these indexes.

b) Ranks

Each of the 54 counties (and districts) have been ranked according to each separate rate of fertility (except age specific) for each year, with the highest ranked first and the lowest ranked 54th.<sup>5</sup>

Table VI gives an example of the rankings for Kenora from 1961 to 1964. It can be seen that in 1961 Kenora had the highest crude birth rate and general fertility rate, the second highest total fertility rate and gross reproduction rate, and the third highest child-woman ratio. In 1964, Kenora still ranked first in crude and general fertility rates, had moved to first in the total fertility rate, slipped to fourth in the gross reproduction rate, and was second in child-woman ratio. The rankings give a good indication of how an individual county compares with the other counties in year-to-year changes in fertility.

Table V – Selected County Indexes<sup>1</sup>, 1966

County	General Fert. Rate	Index	Total Fert. Rate	Index
Peterborough	93.2	(74.8) <sup>2</sup>	98.4	(2746) <sup>2</sup>
Prince Edward	108.1	(86.8)	113.6	(3170)

<sup>1</sup>Provincial index = 100

<sup>2</sup>Actual rates

<sup>5</sup>Complete tables available by request only.



### III – HISTORICAL FERTILITY TRENDS

An historical review of the patterns of fertility for the Province of Ontario over the past 40-50 years reveals significant fluctuations.

Table VII indicates the levels of fertility for selected years from 1921. Fertility continued to decline during the 1920's and 1930's, increased during the 1940's and 1950's and began to decline again in the 1960's, with current levels being approximately equal to those of the late 1930's and early 1940's. The crude birth rate, which indicates population growth by births, moved from 25.3 births per 1000 population in 1921 to 17.3 in 1936. Shortly thereafter it began to climb, reaching 26.6 in 1956. During the 1960's the rate turned downward reaching an estimated<sup>6</sup> rate of 17.5 per 1000 in 1969.

The total fertility rate, which is considered to be the best single number estimate of fertility, declined from a level of 3221 in 1921 to 2229 in 1936, then climbed to 3742 in 1961 before it again declined to an estimated 2411 in 1969. The total fertility rate in actuality indicates the total number of children that 1000 females would have during their child-bearing years at the existing level of fertility. That is, a total fertility rate of 3200 indicates that 1000 women would have 3200 children during their lives, or 3.2 children per woman. Similarly a rate of 2400 indicates an average of 2.4 children per woman during the reproductive cycle.

#### The Depression

During the depression fertility patterns in Ontario underwent a substantial change.

Table VIII indicates the patterns of fertility change during the depression. From 1930 to 1937 the crude rate dropped from 21.0 to 16.9, a drop of almost 20 per cent, while the total fertility rate dropped from 2747 in 1930 to 2160 in 1937, a decrease of 21 per cent. After 1937 the rates began to climb, with the crude rate reaching 18.3 in 1940 and the total fertility rate 2313.

It is generally conceded that the main causes of the fertility decline in the 1930's were economic. People, finding their incomes greatly reduced during this period, were reluctant to take on the responsibility of additional family members. Furthermore, the search for employment frequently separated husbands from their families. In addition,

single people were less willing to marry during the depression.

**Table VIII – Crude Birth Rates and Total Fertility Rates, Ontario, 1929-1941**

Year	Crude Birth Rate	Total Fertility Rate
1929	20.5	2665
1930	21.0	2747
1931	20.2	2648
1932	19.2	2529
1933	18.1	2368
1934	17.6	2284
1935	17.6	2274
1936	17.3	2217
1937	16.9	2160
1938	17.9	2272
1939	17.3	2201
1940	18.3	2313
1941	19.1	2402

Table IX indicates that the marriage rate per 1000 population fell significantly in the early years of the depression, levelled off during the middle years, then rose again in the waning years. There is little doubt that the decrease in the marriage rate contributed significantly to the decline in fertility during the 1930's.

**Table IX – Marriage Rates per 1000 Population, Ontario, 1929-1940**

Year	Rate	Year	Rate
1929	8.3	1935	7.5
1930	7.6	1936	7.7
1931	6.9	1937	8.2
1932	6.4	1938	8.1
1933	6.4	1939	9.3
1934	7.3	1940	11.0

#### Post-War Baby Boom

After remaining relatively stable during the war, fertility began to increase rapidly in 1946 and remained at relatively high levels for approximately 15 years. This period of high fertility is known as the "Post-War Baby Boom".

The initial increase in fertility in 1946 and 1947 was likely due to young men returning from war duties and beginning or continuing their families. The higher rates of fertility

**Table X – Crude Birth Rates and Total Fertility Rates, Ontario, 1944-1962**

Year	Crude Birth Rate	Total Fertility Rate
1944	19.7	2472
1945	19.7	2468
1946	23.8	2968
1947	26.1	3276
1948	24.4	3095
1949	24.3	3109
1950	24.3	3110
1951	25.0	3222
1952	25.9	3386
1953	26.3	3483
1954	26.6	3586
1955	26.5	3612
1956	26.6	3657
1957	26.8	3714
1958	26.2	3680
1959	26.3	3773
1960	26.1	3793
1961	25.3	3742
1962	24.6	3689

continued through the 1950's. This continuation was essentially due to continued high marriage rates and a trend toward marrying at younger ages.

With wartime employment, and postwar demands for consumer goods, economic prosperity returned after a long depression. Such innovations as unemployment insurance, subsidization of agricultural production and government responsibility for full employment removed one of the primary reasons for deferment of marriage – the economic.

As the marriage rate began to drop in the middle and late 1950's, the percentage of brides under 25 years of age increased sharply. This trend helped to sustain the relatively high post-war levels of fertility by increasing the numbers of females exposed to legitimate pregnancy in the younger age groups.

The above two factors were not entirely responsible for the continuing high fertility rates during this period. Another factor was that more children were being born per married woman than for many decades in the past. Without accurate data on married female births by single years of age, it is difficult to determine the degree to which each factor contributed to the increased level

<sup>6</sup>Figures for non-census years, while usually reasonably accurate, are based on estimated population figures.



Table XI – Marriage Rates and Percentage of Brides Under 25 Years of Age, Ontario, 1944-1962

Year	Marriages Per 1000 Population	Per Cent of Brides under 25
1944	7.9	65.9
1945	8.5	65.8
1946	11.2	67.4
1947	10.5	66.7
1948	10.1	65.7
1949	9.9	65.8
1950	9.7	66.8
1951	9.8	67.8
1952	9.5	67.3
1953	9.4	67.9
1954	8.8	68.6
1955	8.5	68.5
1956	8.6	69.7
1957	8.3	70.8
1958	8.1	71.1
1959	7.8	72.0
1960	7.5	73.0
1961	7.1	73.3
1962	7.0	74.5

of fertility. It is clear, however, that the interaction of these three factors resulted in substantially increased levels of fertility during the period 1946-1962.

IV – ONTARIO FERTILITY 1961-1969

During the period 1961 to 1969 fertility in Ontario underwent an almost continuous decline of approximately 30 - 35 per cent. There are three main reasons for the decline in fertility during the 1960's. These primary causes can be identified as a decline in the marriage rate, a change in the number of children desired by certain sections of the population, and the knowledge and availability of new and more reliable methods of family planning.

The marriage rate, which declined during the middle and late 1950's, remained at a low level for most of the 1960's, averaging 7.7 marriages per 1000 population, an average rate comparable to the 1930's. Lower rates of marriage mean that a smaller proportion of the population is exposed to legitimate pregnancy, especially in the age groups 16 - 29<sup>1</sup>, which results therefore in lower levels of fertility.

<sup>1</sup>15 year olds are not included since very few marriages occur at this age.

Table XII – Crude Birth Rates and Total Fertility Rates, Ontario, 1961-1969

Year	Crude Birth Rate	Per Cent Change	Total Fert. Rate	Per Cent Change
1961	25.3	—	3742	—
1962	24.6	— 2.8	3689	— 1.4
1963	23.9	— 2.8	3618	— 1.9
1964	23.0	— 3.8	3475	— 4.0
1965	20.9	— 9.1	3125	—10.1
1966	19.0	— 9.1	2790	—10.7
1967	17.8	— 6.3	2567	— 8.0
1968	17.3	— 2.8	2434	— 5.2
1969	17.5	+ 1.2	2411	— .9
Per Cent Change 1961-1969				—30.8
				—35.6

Table XIII – Marriage Rates, Ontario, 1931-1969

Year	Marriages Per 1000 Population
1931-1940 (average)	7.9
1941-1950 (average)	10.0
1951-1960 (average)	8.6
1961	7.1
1962	7.0
1963	7.0
1964	7.3
1965	7.6
1966	7.8
1967	8.2
1968	8.5
1969	9.0 <sup>1</sup>
1961-1969 (average)	7.7

<sup>1</sup>preliminary data.

Table XIV – Marriage Rates, Ontario, 1956-1966

Year	Marriages Per 1000 Pop.	Per Cent Change 1956-66	Total Marriage Rate – Brides Aged 16-19	Per Cent Change 1956-66	Per Cent of Females Aged			Average Per Cent Age Group Change (1956-66)
					16-19	20-24	25-29	
1956	8.6		1072		5.8	6.8	7.7	
1966	7.8	—9.3	915	—14.6	7.8	7.0	6.2	19



One of the most important developments during this period was the introduction of the oral contraceptive or birth control pill. The "pill" is considered to be one of the easiest and most effective methods of birth control. A recent Canadian study<sup>8</sup> indicated that in November, 1967, 28.9 per cent of married females under the age of 46 were using oral contraceptives and another 21.1 per cent planned to use them. Among the women not using orals, 31.1 per cent were using other means, 19.9 per cent were using no method and 20.1 per cent were pregnant or sterile. Among those not using oral contraceptives, 35 per cent cited the possible health hazard as the reason while another 16.5 per cent cited unpleasant side effects. Only 10.4 per cent cited religious objections. This study was done for Canada, however, and it is possible that Ontario statistics would show an even higher usage rate for oral contraceptives.

#### Age Specific Rates

Age specific birth rates give the clearest picture of fertility trends from 1961-1969. The rate for females 15-19 dropped from 69.5 births per 1000 to 49.2 during this period — a drop of 29.2 per cent. Although a significant reduction, this was the smallest of the age specific rate decreases. A large number of pregnancies in this age group are accidental pregnancies, reflecting the performance of persons unaccustomed to practising birth control. During the period 1961-1968, for instance, the legitimate fertility rate for this age group fell 33 per cent while the

illegitimate rate actually rose 18 per cent. Illegitimate births accounted for 28 per cent of all births from this age group in 1968.

The age specific rate for females 20-24 fell 36.5 per cent between 1961 and 1969, from 239.8 births per 1000 to 152.2. The reduction in the marriage rate affects this age group more than others, and no doubt played a significant role in the decline of this birth rate during the period. Furthermore, it is in the age group 20-24 that couples are most likely to defer pregnancy. In addition, the tendency toward spacing lessens the chances of having more than one child during this period. Illegitimate births accounted for only eight per cent of all births in this age bracket.

Table XV shows twelve separate rates of fertility for Ontario; seven age specific rates, the crude birth rate, the general fertility rate, the total fertility rate, the gross reproduction rate and the child-woman ratio, for the years 1961 through 1969.

The age group 25-29 reflected a decline from 211.6 in 1961 to 148.4 in 1969 — a drop of 29.9 per cent. This age group too is affected by the lowering of the marriage rate. In addition, some families have already decided to have no more children by the time they reach this age. It is likely that the drop in fertility was not as great as for the 20-24 age group because pregnancies deferred from that group were likely to occur in this age category.

The remaining age groups all experienced declines in fertility from 35.7 per cent to 51.1 per cent. These declines likely resulted from the combination of better family plan-

ning techniques and a commitment to limit family size among a significant portion of persons of these ages.

#### Crude Birth Rate

The crude birth rate for Ontario measured 25.3 in 1961, dropped to 17.3 by 1968 and then rose slightly to 17.5 in 1969. The biggest declines in the crude rate occurred in 1965 and 1966. It is difficult to explain precisely the apparent rise in the rate in 1969, although it is probably a combination of a slowing in the rate of fertility decline and an increase in the proportion of females in the early childbearing ages.

#### General Fertility Rate

The general fertility rate followed the pattern of the crude rate almost exactly. From a high of 108.3 births per 1000 women 15-49 in 1961, it moved to a low of 71.9 in 1968, only to rise slightly to 72.0 in 1969. It is likely that the rise in the rate in 1969 was for the same reasons as the rise in the crude rate.

#### Total Fertility Rate

The total fertility rate for the province declined each year during the period 1961-1969. From a high of 3742 in 1961, the rate had reached 2411 by 1969, a decline of 35.6 per cent. The rate declined most quickly in 1965 and 1966, dropping from 3475 to 2790 during these two years. If the rate were to remain at the 1969 level, each female would average approximately 2.4 children as she passed through the childbearing cycle (disregarding mortality).

**Table XV — Ontario Birth Rates, 1961-1969**

Year	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Crude Birth Rate	General Fert. Rate	Total Fert. Rate	Gross Reprod. Rate	Child/Woman Ratio
1961	69.5	239.8	211.6	134.2	69.8	21.9	1.6	25.3	108.3	3742	1824	.508
1962	64.5	239.9	210.5	133.9	65.6	21.9	1.4	24.6	105.6	3689	1796	.511
1963	60.3	233.7	208.1	133.1	66.2	21.1	1.2	23.9	102.9	3618	1759	.508
1964	57.8	219.7	202.4	128.6	64.6	20.4	1.6	23.0	98.6	3475	1686	.499
1965	58.3	192.9	180.6	114.5	59.3	17.8	1.5	20.9	89.0	3125	1521	.486
1966	57.4	171.3	160.2	98.8	52.8	16.2	1.3	19.0	80.3	2790	1361	.467
1967	53.4	162.0	149.2	88.6	45.9	13.4	1.0	17.8	74.8	2567	1247	.427
1968	50.1	155.1	145.0	83.0	41.1	11.5	1.0	17.3	71.7	2434	1184	.398
1969	49.2	152.2	148.4	82.3	38.3	10.7	.8	17.5	72.0	2411	1174	.373
Per Cent Change 1961-1969	-29.2	-36.5	-29.9	-38.7	-45.1	-51.1	-50.0	-30.8	-33.5	-35.6	-35.6	-26.6

<sup>8</sup>Allingham, John D., Balakrishnan, T. R. and Kantner, John F.; The End of Rapid Increase in the Use of Oral Anovulants? Some Problems in the Interpretation of Time Series of Oral Use Among Married Women. *Demography*, Vol. 7, Number 1, February, 1970.



Gross Reproduction Rate

The gross reproduction rate is similar to the total fertility rate except it is only calculated for female births. Since, for a population the size of Ontario, the ratio of female births to total births remains relatively constant at .485 to .488, the gross reproduction rate follows almost exactly the trends of the total fertility rate. The gross reproduction rate declined from 1824 in 1961 to 1174 in 1969, a drop of 35.6 per cent, the same as the total fertility rate. If the gross reproduction rate remains at the 1969 level, each woman will average approximately 1.2 female children during the reproductive cycle<sup>9</sup>.

Child-Woman Ratio

The child-woman ratio declined from .508 in 1961 to .373 in 1969, a drop of 26.6 per cent. Because of the structure of this ratio it is not as reliable as others in judging yearly changes. Nevertheless the child-woman ratio does indicate overall trends in fertility since it acts as a type of five-year moving average. For this reason also, the ratio tends to lag two or three years behind actual changes in fertility.

Summary

In summary, Ontario experienced a continued decline in fertility between 1961 and 1969. The decline averaged 30-35 per cent. The result of this decline may be felt for generations as reduced cohorts of child-bearers reach the reproductive ages 15-20 years hence. This smaller childbearing population will result in a slowdown in the speed at which Ontario would normally be expected to add to itself by births. This point will be expanded in Chapter VI.

V – COUNTY FERTILITY

All Ontario counties and districts experienced a general decline in fertility during the 1960's. Some counties, such as Stormont and Bruce, showed continually declining rates of fertility for each year during the period 1961-1969. For other counties such as Perth, the decline did not begin until 1963, whereas in Huron County and the District of Parry Sound, the decline lasted only until 1968, with increases in fertility being shown for 1969.

1961

In 1961 the crude birth rates for the 54 counties and districts of Ontario ranged from

a high of 33.5 births per 1000 population in the District of Kenora to a low of 18.7 in Grey County. Kenora's crude birth rate was 32.4 per cent above the provincial level of 25.3, while Grey's rate was 26.1 per cent below the provincial figure. In all there were 31 counties above the provincial level and 21 counties below it. Carleton and Middlesex counties each had rates of 25.3, equal to the provincial rate. York County, the largest in Ontario, made up 27.8 per cent of the total provincial population in 1961. York, therefore, has the largest influences on the provincial rates. In 1961 York had a crude rate of 24.9 births per 1000 population. This rate had an index of 98.4 and ranked 24th among the counties and districts.

The general fertility rate ranged from 154 births per 1000 females aged 15-49 in Kenora to 92.2 births per 1000 in Grey. Kenora's rate was 42.2 per cent above the provincial level while Grey's was 14.9 per cent below it. York County had a general fertility rate of 98.9. The index was 91.3 and York ranked 49th among the counties and districts for this rate. There were 29 counties with rates above the provincial level of 108.3 and 25 counties below this figure.

As outlined in Chapter II the sum of the age specific birth rates, or "Total Fertility Rate" is considered to be the best single number estimate of the fertility of a population. A careful examination of individual age specific rates is necessary however, if a detailed knowledge of changing fertility patterns within a homogeneous population is desired. Although presentation of these rates is beyond the scope of this review, detailed tables showing five-year age specific rates for each calendar year 1961-1969 are available upon request from the Demographic Studies Section, Economic Analysis Branch, Department of Treasury and Economics, Frost Bldg., Queen's Park, Toronto 182. Readers

are urged to make a careful examination of these tables, should knowledge concerning detailed fertility patterns be required.

Total fertility rates for 1961 ranged from 5191 in the District of Manitoulin to 3324 in York County. Manitoulin's rate had an index of 138.7 while York's index was 88.8 when compared with the provincial total fertility rate of 3742. It is interesting to note that Manitoulin ranked 11th in crude birth rate and York 24th, while in total fertility rate Manitoulin ranked first and York 54th. This indicates the caution which must be used when comparing fertility levels by means of the crude rate alone. In 1961 there were 40 counties and districts whose total fertility rate was higher than the provincial level and 14 whose rates were lower.

The gross reproduction rates, which are usually just less than one-half of the total fertility rates, ranged from Manitoulin's high of 2596 to a low of 1589 in Grey County. York had a rate of 1615 and was ranked 53rd among the counties and districts. In all 38 counties were higher than the provincial rate of 1824, and 16 were lower.

The child-woman ratio, which is the ratio of children aged 0-4 to females aged 15-49, ranged from a high of .682 in Russell County to a low of .437 in York. The provincial ratio was .508, with 37 counties having higher ratios and 17 counties having lower.

1962

1962 was the year in which many counties and districts began to experience a downward trend in fertility. For others, however, it represented the final year of the post-war baby boom.

Table XVI shows the number of counties and districts which increased or decreased with respect to the five measures of fertility during 1962. There were 12 counties and districts, for example, which showed an in-

Table XVI – Directional Movements in Fertility, Counties and Districts, 1962

	Crude Birth Rate	General Fert. Rate	Total Fert. Rate	Gross Reprod. Rate	Child/Woman Ratio	Total	Average
Increases over 1961	12	16	18	20	21	87	17.4
Decreases over 1961	39	37	36	34	28	174	34.8
No Change	3	1	0	0	5	9	1.8
Total	54	54	54	54	54	270	54

<sup>9</sup>For this study all rates except the crude rates are based on females aged 15-49. Births occurring outside these age groups are not considered. In 1968, however, these births represented only 100 out of a total of 126,257.



crease in the crude birth rate over the 1961 figure, 39 counties and districts which showed a decrease, and three which remained the same. On the average, decreases in fertility rates outnumbered increases two to one. It appears then, that for about two-thirds of Ontario's counties and districts, the year 1962 marked the beginning of the large fertility declines of the 1960's.

In 1962, the District of Kenora had the highest levels of fertility among the districts and counties. Kenora ranked first in the crude birth rate, general fertility rate, total fertility rate, and gross reproduction rate, while ranking third in child-woman ratio. The fertility indexes for Kenora averaged 134.5 across the five fertility rates, 34.5 per cent higher than corresponding provincial rates. York and Haliburton shared the lowest rates of fertility with York having the lowest total fertility rate and child-woman ratio, while Haliburton had the lowest crude birth rate, general fertility rate and gross reproduction rate. York's indexes averaged 90.3 while Haliburton's averaged 85.7. York County however had a total fertility rate of 3264 whereas Haliburton's was 3323.

### 1963

By 1963 almost all counties had begun their declines in fertility. Table XVII indicates that almost all counties showed declines in fertility over corresponding 1961 rates. Declining fertility measures outnumbered increases four to one. Of the 54 counties and districts, for example, 48 showed declines in crude birth rate and 42 showed declines in the total fertility rate.

During 1963 Kenora and Manitoulin shared the highest fertility rates with Kenora being highest in the crude birth rate and general fertility rate, while Manitoulin ranked first in total fertility rate and gross reproduc-

**Table XVIII – Directional Movements in Fertility, Counties and Districts, 1968**

	Crude Birth Rate	General Fert. Rate	Total Fert. Rate	Gross Reprod. Rate	Child/ Woman Ratio	Total	Avg.
Increases over 1967	16	12	10	16	0	54	10.8
Decreases over 1967	38	42	44	38	54	216	43.2
Total	54	54	54	54	54	270	54

tion rate. The total fertility rate of 4874 for Manitoulin, although highest in the province, was still six per cent lower than the 1961 rate of 5191. The lowest levels of fertility were in Northumberland County which had a total fertility rate of 3169, 12.4 per cent below the provincial figure of 3618.

### 1964-1967

The period 1964-1967 encompassed the largest fertility declines of the decade. Decreases in fertility averaged 7.1 per cent per year during this period when all indexes were considered, and 8.2 per cent for the total fertility rate itself. There were no counties or districts which showed increasing fertility trends during this period. Kenora and Manitoulin continued to lead the province in high fertility levels. The total fertility rates for these districts, however, fell from 4698 to 3528 and from 4874 to 3656 respectively. York County, although maintaining a relatively low level of fertility, did not decline as quickly as the county average. The total fertility rate index, for example, climbed steadily from 91.1 in 1964 to 95.6 in 1967. The county exhibiting the greatest change during this period was Prescott, with the total fertility rate declining from a 1963 year-end figure of 4311 to a 1967 figure of 2506 – a drop of 41.8 per cent.

### 1968

In 1968 a slowdown in fertility declines took place. Indeed, some county and district rates began to increase slightly.

As shown in Table XVIII, 16 counties had increased crude birth rates in 1968 when compared with the 1967 figures. Counties averaged about one decrease in rate for every four increases. No county experienced a decrease in the child-woman ratio, probably due to the construction of the index. In 1968 Kenora once again had the highest levels of fertility, ranking first in all measures except the child-woman ratio. Kenora's total fertility rate of 3686 was 51 per cent above the provincial rate of 2434. Kenora was also one of the districts which showed an increase in fertility during 1968. The lowest fertility rates were shared by Muskoka, Frontenac, Welland and York, with Frontenac having the lowest total fertility rate at 2119. In general, fertility continued to decline in most counties, but these declines averaged only three to five per cent compared with declines of six to eight per cent the preceding year.

### 1969

Provisional data indicate that by 1969 the fertility decline had levelled off. Provincial measures show a small increase in crude rates and general fertility rates, and a slight decrease in total fertility and gross reproduction rates.

From Table XIX it can be seen that, in 1969, 35 counties and districts showed increases in the crude birth rate and general fertility rate, 30 showed increases in the total fertility rate while the gross reproduction rate rose in 28 areas. The reason, once again, for no increases in the child-woman ratio, is the method of constructing the index. That is, the index measures fertility over a period of five years, not one year.

A geographical analysis reveals that counties which experienced increases in fertility in

**Table XVII – Directional Movements in Fertility, Districts and Counties, 1963**

	Crude Birth Rate	General Fert. Rate	Total Fert. Rate	Gross Reprod. Rate	Child/ Woman Ratio	Total	Average
Increases over 1961	4	5	12	16	16	53	10.6
Decreases over 1961	48	49	42	38	37	214	42.8
No Change	2	0	0	0	1	3	.6
Total	54	54	54	54	54	270	54



**Table XIX — Directional Movements in Fertility, Counties and Districts, 1969**

	Crude Birth Rate	General Fert. Rate	Total Fert. Rate	Gross Reprod. Rate	Child/ Woman Ratio	Total	Avg.
Increases over 1968	35	35	30	28	0	128	25.6
Decreases over 1968	16	19	24	26	54	139	27.8
No Change	3	0	0	0	0	3	.6
Total	54	54	54	54	54	270	54

1969 tended to be concentrated in the northern and central parts of Ontario, as well as in the Niagara area and south-western Ontario. Counties in the southern Georgian Bay and Lake Huron areas, as well as the far western portion of Ontario continued to experience declining fertility. In the eastern portions of Ontario, no trend was evident in either direction.

In spite of the direction of fertility movement, changes during 1969 tended to be small for most counties and districts. Furthermore, since differences between 1968 and 1969 figures did tend to be small, caution should be used in interpreting directional changes. Rates are based on estimated populations, and even a small error in population could change the direction of some rates. In summary, 1969 was not a year of rapid changes in fertility.

#### Regions, 1961-1969

During the period 1961-1969 the ten economic regions of Ontario demonstrated fertility trends which followed patterns somewhat similar to the provincial rates.

Table XX shows the total fertility rates for each economic region from 1961 to 1969. All regions demonstrated a marked decline in fertility over these years. While Northeastern and Northwestern Ontario were consistently highest during this period, these two regions experienced the largest declines in fertility, with the Northeastern region declining by 39.5 per cent from 4567 in 1961 to 2761 in 1969, and the Northwestern region declining 37.7 per cent from 4477 in 1961 to 2789 in 1969. Central Ontario remained the region with the lowest fertility rates until 1968 when Eastern Ontario became lowest.

Three regions, Niagara, Lake Erie and Northeastern, showed increases in fertility in 1969 over 1968 levels. All remaining regions showed a decline. For most regions however,

changes between 1968 and 1969 were relatively small.

In summary, the districts, counties, regions and sub-regions of Ontario exhibited declines in fertility during the 1960's. Declines began slowly, reaching a peak in about 1966 and slowed up again in 1968 and 1969. On the average, fertility declined 30-35 per cent during the period 1961 to 1969.

#### Rural-Urban Differences

During the period 1961 to 1969, marked differences in fertility existed between predominantly rural counties and predominantly urban counties. Table XXI shows the total fertility rates for urban and rural counties during 1961-1969 as well as weighted averages for each year and the total period. For each year the rural county rates were higher than urban county rates, with the differences in averages ranging from 10 to 25 per cent. Between 1962 and 1968, years in which both rural and urban county fertility averages declined, the differences between the rates decreased. In 1969 however, the average rural rate increased, and again the gap be-

tween rural county fertility and urban county fertility widened.

The highest rates among the urban counties were in Peel, which averaged 3301 over the nine-year period. These rates were still lower than the lowest of the rural rates — an average of 3337 in Huron County. Over the nine-year period rural county fertility averaged 18.6 per cent higher than urban county fertility. Although this evidence does not prove conclusively the demographic hypothesis that rural fertility is higher than urban fertility, it does indicate that for the province of Ontario counties which are predominantly rural do have higher levels of fertility than counties which are predominantly urban.

## VI — THE FUTURE

### The Province

Recent levels of fertility for the province of Ontario indicate that the decline in fertility, so prominent in the middle 1960's, may be ending. The total fertility rate declined less than one per cent between 1968 and 1969 while the crude rate actually rose 1.2 per cent, reflecting both the levelling off of fertility and an increase in the proportion of females in the early childbearing years. It appears that provincial fertility may remain close to current levels over the next few years. With regard to the age specific rates, it is possible that the older age groups (30-34, 35-39, 40-44 and 45-49) will continue to show small declines. The age group 25-29 showed an increase in fertility between 1968 and 1969, and it is likely that further increases can be expected within this category. The performance of the 15-19 age group is not likely to change significantly. It is in the

**Table XX — Total Fertility Rates, Regions, 1961-1969**

Regions	1961	1962	1963	1964	1965	1966	1967	1968	1969
Eastern Ontario	3841	3846	3791	3607	3000	2701	2487	2350	2292
Lake Ontario	3983	3818	3733	3598	3119	2782	2555	2398	2390
Central	3430	3352	3338	3249	2935	2685	2482	2351	2309
Niagara	3521	3537	3477	3381	3131	2776	2492	2284	2313
Lake Erie	3664	3651	3508	3357	2912	2688	2516	2374	2419
St. Clair	3929	3841	3739	3561	3394	2998	2710	2645	2600
Midwestern Ontario	3813	3843	3785	3658	3348	2982	2708	2622	2605
Georgian Bay	4086	4047	3949	3777	3320	2808	2688	2560	2555
Northeastern Ontario	4567	4544	4339	4133	3644	3110	2881	2749	2761
Northwestern Ontario	4477	4281	4033	3736	3446	3244	2908	2801	2789
TOTAL ONTARIO	3742	3689	3618	3475	3125	2790	2567	2434	2411



**Table XXI – Total Fertility Rates, Urban and Rural Counties, 1961-1969****Predominantly Rural Counties**

County	1961	1962	1963	1964	1965	1966	1967	1968	1969	Avg.
Bruce	4727	4659	4468	4371	4134	3275	2960	2918	2733	3805
Dufferin	3798	3723	3761	4036	3195	3116	2840	3195	3217	3431
Dundas	3921	4181	3747	3826	3379	2707	2952	2528	3000	3360
Glengarry	4533	4797	4510	4727	3839	3773	3225	3112	2617	3904
Haldimand	4357	3855	4036	4068	3326	3049	2620	2607	2860	3420
Huron	4148	4296	4082	3698	3350	2857	2605	2493	2506	3337
Lennox & Addington	3793	3894	3807	3918	3377	3055	2819	3037	2731	3381
Muskoka	3924	4044	3849	3470	3099	2460	2244	2323	2660	3119
Parry Sound	4537	4706	4501	4084	3668	3096	3084	2605	2792	3675
Prescott	4435	4641	4311	4200	3798	2993	2506	2413	2472	3530
Weighted Average	4266	4320	4146	4016	3543	3019	2752	2687	2717	

Overall 9-Year Weighted Average = 3496

**Predominantly Urban Counties**

County	1961	1962	1963	1964	1965	1966	1967	1968	1969	Avg.
Carleton	3543	3568	3533	3356	2691	2562	2423	2318	2206	2911
Essex	3747	3736	3685	3563	3510	3112	2793	2638	2612	3266
Lincoln	3442	3549	3408	3453	3140	2802	2493	2316	2416	3002
Middlesex	3617	3572	3385	3177	2752	2573	2362	2229	2261	2881
Ontario	3892	3740	3495	3764	3287	2833	2537	2331	2434	3146
Peel	4059	4012	3812	3734	3365	2912	2630	2573	2614	3301
Waterloo	3693	3677	3605	3527	3345	3050	2721	2579	2608	3201
Welland	3609	3532	3501	3245	3143	2797	2539	2279	2318	2996
Wentworth	3454	3497	3430	3325	3057	2718	2439	2223	2240	2931
York	3324	3264	3256	3166	2871	2634	2453	2317	2269	2839
Weighted Average	3485	3451	3398	3301	2984	2716	2496	2349	2332	

Overall 9-Year Weighted Average = 2946

Per Cent Difference – Rural Weighted Average: Urban Weighted Average  
 22.41 25.18 22.01 21.66 18.73 11.16 10.26 14.39 16.51

Per Cent Difference – Rural Overall 9-Year Weighted Average:  
 Urban Overall 9-Year Weighted Average = 18.67

20-24 age group that changes are most difficult to forecast. This is the age group most affected by changes in marriage rates, spacing practices, etc. It is likely that any large changes in fertility will be found in this age bracket.

The crude birth rate and the general fertility rate will probably continue to increase slightly, reflecting the increasing proportions of females entering the childbearing ages. The total fertility rate and the gross reproduction rate should remain relatively stable. The child-woman ratio, however, will con-

tinue to decline, reflecting not only the declines in fertility over the past five years, but the increasing proportion of females 15-49 as a result of the high levels of fertility in the late 1940's and early 1950's.

As mentioned in Chapter IV, the low rates of fertility during the 1960's will result in reduced numbers of females in the childbearing years 15-20 years hence.

Table XXII indicates that at 1961 crude birth rates, a total of 754,838 females would enter the childbearing years between 1976 and 1984, if mortality and migration were

disregarded. In actual fact, however only 622,438 females will be available to enter, due to the reduced fertility during the 1960's. As a result of this reduced cohort of women entering the childbearing years during this period, the rate of Ontario's population growth through births can be expected to decline. This, in turn will slow the rate of population increase over this period. Although females enter the childbearing years at age 15, their most productive years are 20-30. Therefore, the largest effect of this reduced cohort will be seen in the years 1980-1989, when this smaller cohort of women will be in their most fertile period.

Table XXIII indicates population projections for the years 1971-1991. These projections are based on constant migration and fertility rates and slightly declining mortality rates. Under these conditions it would be expected that the rate of population increase would continue to rise each year. In truth, however, the rate of increase shows a small decline during the period 1981-1986 and a larger decline between 1986 and 1991.

This decline in the rate of population increase must be attributed to smaller cohorts of women moving through the most productive childbearing years – a direct result of the low fertility rates of the 1960's.

**Counties and Districts**

Fertility rate changes in the counties and districts of Ontario are more difficult to forecast than provincial rate changes. It is not likely however, that large changes in fertility can be expected in more than a few counties or districts. Districts such as Muskoka and Manitoulin showed sudden large increases in fertility between 1968 and 1969. However, it is difficult to forecast whether these sudden increases will continue. Compounding the problem is the fact that many counties, because of their population size, have only a small number of births from which to calculate rates. Manitoulin, for example had only 202 total births in 1969. A small number of births either way could greatly affect the rates. In general, however, it is probable that for the majority of counties and districts, fertility changes will be quite small. Reduced cohorts of women resulting from low fertility rates in the 1960's will have similar effects on the counties and districts of Ontario, as on the total province.



Table XXII – Expected Number of Females Entering Childbearing Years, 1976-1984  
(Migration and Mortality Excluded)

Year	Females (At 1961 Crude Birth Rate)	Females (At Actual Crude Birth Rate) (1961-1969)
1976	76,877 (25.3) <sup>1</sup>	76,877 (25.3) <sup>1</sup>
1977	78,117	75,979 (24.6)
1978	79,716	75,400 (23.9)
1979	81,561	74,090 (23.0)
1980	83,492	68,897 (20.9)
1981	85,619	64,364 (19.0)
1982	87,932	61,958 (17.8)
1983	89,864	61,428 (17.3)
1984	91,660	63,490 (17.5)
TOTAL	754,838	622,483

<sup>1</sup>crude birth rate

Table XXIII – Population Projections,  
Ontario, 1971-1991

Year	Projected Population <sup>1</sup>	Average Yearly Percentage Increase
1971	7,550,200	
1976	8,121,400	1.51 (1971-1976)
1981	8,767,400	1.59 (1976-1981)
1986	9,461,900	1.58 (1981-1986)
1991	10,147,000	1.45 (1986-1991)

<sup>1</sup>See: Preliminary Population Projections for Ontario, 1971-1991, *Economic Analysis Branch, Economic and Statistical Services Division, Department of Treasury and Economics.*

VII – CONCLUDING SUMMARY

The purpose of this study has been to examine the levels of fertility for the counties and regions of Ontario. Since a discussion of future provincial fertility levels is not the prime concern of this monograph, reference to the effect of changing social values on fertility has been kept to a minimum. It

must be realized, however, that in today's society, with modern birth control methods available to all, fertility may not so much be in the hands of economics or of chance, but dependent upon the changing social norms of family life. That is to say, the decision to have a child or not will rest more and more with an individual's perception of his ideal

family size and less and less with economic dictates or with chance. In any study of future fertility, therefore, more account must be taken of such things as desired family size, desired age at marriage, the possibilities of trial marriages, sterilization, etc. In short, the relationship between society and fertility cannot be overlooked.



Fertility Rates for Ontario Regions, 1961-1969

Regions	Age Specific Rates							Crude Birth Rate	General Fertility Rate	Total Fertility Rate	Gross Reproduc- tion Rate	Child/ Woman Ratio
	15-19	20-24	25-29	30-34	35-39	40-44	45-49					
EASTERN ONTARIO												
1961	60.3	240.1	222.0	142.8	76.2	24.9	1.8	25.4	109.7	3,841	1,856	.519
1962	60.4	240.4	222.3	143.0	76.3	24.9	1.8	25.1	109.2	3,846	1,868	.520
1963	55.6	243.0	218.1	142.3	73.6	24.3	1.2	24.5	106.1	3,791	1,853	.511
1964	50.5	222.9	214.9	137.4	70.5	22.9	2.2	23.4	100.7	3,607	1,751	.497
1965	46.4	181.5	175.5	116.2	59.7	19.0	1.6	19.7	84.1	3,000	1,460	.477
1966	46.6	162.8	153.9	101.9	55.8	17.7	1.5	18.0	76.6	2,701	1,305	.455
1967	42.9	155.6	148.5	86.9	48.0	14.3	1.8	16.9	71.5	2,487	1,208	.428
1968	41.7	148.3	144.6	82.5	39.0	12.6	1.3	16.4	68.5	2,350	1,152	.399
1969	41.2	139.1	144.7	81.3	39.5	11.4	1.1	16.3	67.4	2,292	1,115	.371
LAKE ONTARIO												
1961	70.0	269.2	222.4	137.4	72.7	23.2	1.6	23.9	110.3	3,983	1,976	.548
1962	67.1	158.1	213.2	131.7	69.7	22.2	1.5	22.6	104.3	3,818	1,859	.544
1963	61.0	265.0	204.0	131.0	64.6	19.2	1.7	21.7	100.6	3,733	1,824	.537
1964	56.7	245.5	204.3	124.3	65.6	21.9	1.2	21.0	96.5	3,598	1,733	.520
1965	51.6	211.7	174.0	109.6	55.3	19.8	1.8	18.3	83.7	3,119	1,525	.501
1966	53.7	180.2	158.2	93.6	52.2	16.1	2.4	16.7	75.8	2,782	1,338	.473
1967	46.0	175.1	145.1	84.5	42.5	16.9	.8	15.6	70.3	2,555	1,233	.446
1968	48.3	161.3	142.3	75.8	37.6	13.6	.7	15.0	67.1	2,398	1,184	.416
1969	48.6	161.0	144.8	75.7	34.3	12.6	.9	15.3	67.7	2,390	1,164	.389
CENTRAL												
1961	68.1	212.3	197.8	126.5	62.3	17.4	1.6	25.3	101.6	3,430	1,670	.459
1962	66.5	207.5	193.3	123.6	60.9	17.0	1.6	24.3	98.5	3,352	1,627	.465
1963	60.0	205.9	195.7	127.8	59.7	17.5	1.0	24.1	97.7	3,338	1,631	.465
1964	61.8	196.1	190.3	124.5	58.9	17.0	1.1	23.5	95.0	3,249	1,572	.457
1965	62.0	170.6	172.0	111.7	55.0	14.6	1.0	21.3	86.1	2,935	1,424	.446
1966	60.9	158.1	155.5	97.7	49.6	14.3	1.1	19.8	79.2	2,685	1,318	.422
1967	55.5	149.8	145.4	89.1	43.9	11.8	.8	18.7	74.0	2,482	1,212	.398
1968	51.2	142.2	140.0	84.8	40.9	10.2	.9	18.1	70.9	2,351	1,138	.373
1969	49.4	139.5	141.6	83.9	37.4	9.3	.7	18.1	70.4	2,309	1,127	.349
NIAGARA												
1961	64.0	228.6	203.7	125.6	62.7	18.0	1.5	23.4	99.6	3,521	1,711	.489
1962	64.3	229.6	204.6	126.2	63.0	18.1	1.5	23.2	99.1	3,537	1,718	.490
1963	55.4	226.6	206.2	127.2	60.5	18.6	.8	22.6	96.5	3,477	1,669	.488
1964	52.7	222.1	199.7	123.2	59.4	17.5	1.5	22.0	93.7	3,381	1,631	.477
1965	55.7	201.5	182.1	111.6	57.6	16.4	1.3	20.5	87.3	3,131	1,531	.463
1966	57.0	173.9	166.4	93.0	49.4	14.8	.7	18.5	76.8	2,776	1,355	.440
1967	51.6	161.5	148.4	81.7	42.6	11.8	.8	16.7	71.2	2,492	1,206	.414
1968	46.4	145.4	137.7	77.5	39.5	9.3	1.0	15.9	65.9	2,284	1,100	.387
1969	47.3	148.2	145.9	74.7	36.4	9.4	.7	16.5	67.7	2,313	1,123	.362
LAKE ERIE												
1961	74.2	238.3	209.6	124.0	65.0	20.3	1.3	24.1	105.1	3,664	1,784	.494
1962	73.9	237.5	208.9	123.6	64.8	20.2	1.3	23.7	103.5	3,651	1,774	.496
1963	64.4	236.4	194.5	124.6	60.9	19.7	1.0	22.8	99.5	3,508	1,678	.494
1964	56.2	213.9	203.4	120.6	58.1	17.8	1.3	21.8	94.9	3,357	1,644	.483
1965	57.5	184.3	171.1	99.5	53.4	15.4	1.1	19.2	83.1	2,912	1,405	.468
1966	56.4	163.0	159.7	93.3	50.7	13.4	1.1	18.0	77.4	2,688	1,293	.446
1967	52.1	154.7	152.9	84.9	45.9	11.9	.8	17.3	73.4	2,516	1,230	.420
1968	48.5	153.6	149.8	75.4	37.5	9.5	.5	16.7	70.4	2,374	1,170	.391
1969	47.8	152.9	154.7	82.7	35.4	9.6	.6	17.4	72.3	2,419	1,176	.366



## Fertility Rates for Ontario Regions, 1961-1969

Regions	Age Specific Rates							Crude Birth Rate	General Fertility Rate	Total Fertility Rate	Gross Reproduc- tion Rate	Child/ Woman Ratio
	15-19	20-24	25-29	30-34	35-39	40-44	45-49					
ST. CLAIR												
1961	64.5	260.9	219.4	137.5	77.2	24.0	2.2	25.0	111.3	3,929	1,937	.541
1962	63.0	255.0	214.5	134.4	75.5	23.5	2.2	24.1	107.7	3,841	1,900	.540
1963	54.5	245.4	217.2	132.8	72.9	23.9	1.1	23.2	103.8	3,739	1,809	.535
1964	54.2	230.3	203.7	126.4	73.7	22.3	1.6	22.2	98.9	3,561	1,745	.520
1965	60.8	217.8	195.2	118.4	65.2	19.5	1.9	21.4	94.8	3,394	1,626	.502
1966	60.4	196.3	169.5	97.4	56.3	18.6	1.1	19.3	85.0	2,998	1,457	.478
1967	55.6	185.9	153.2	84.0	46.6	15.6	1.1	17.9	78.1	2,710	1,304	.450
1968	52.6	180.1	161.2	82.8	39.9	11.6	.8	17.8	76.9	2,645	1,256	.420
1969	52.3	180.2	158.5	79.1	37.8	11.4	.7	18.0	76.8	2,600	1,261	.393
MIDWESTERN ONTARIO												
1961	62.9	243.1	215.3	140.1	73.5	26.5	1.2	24.2	108.1	3,813	1,861	.522
1962	63.4	245.0	217.0	141.2	74.1	26.7	1.2	24.2	108.6	3,843	1,885	.526
1963	56.8	243.0	221.2	142.2	67.9	24.4	1.4	23.6	106.0	3,785	1,860	.525
1964	55.8	232.2	211.0	136.3	70.2	24.3	1.7	23.0	102.8	3,658	1,782	.515
1965	58.0	208.2	195.7	118.7	65.2	21.9	1.9	21.4	95.0	3,348	1,637	.502
1966	54.2	183.6	172.8	107.1	59.9	17.5	1.4	19.5	83.7	2,982	1,437	.481
1967	49.3	168.6	158.4	98.5	50.5	15.7	.6	18.1	78.7	2,708	1,303	.454
1968	45.2	163.3	163.6	90.6	46.5	14.2	.9	17.9	77.0	2,622	1,292	.423
1969	47.2	161.9	165.2	92.0	41.1	12.6	1.0	18.2	77.6	2,605	1,270	.396
GEORGIAN BAY												
1961	73.3	276.0	220.1	139.0	78.8	27.1	2.8	22.8	110.5	4,086	1,965	.542
1962	72.6	273.4	218.0	137.6	78.1	26.8	2.8	22.2	108.0	4,047	2,008	.541
1963	60.5	278.7	216.1	136.2	72.3	24.4	1.6	21.3	103.9	3,949	1,931	.536
1964	58.1	256.5	213.8	132.1	68.0	25.0	1.9	20.3	99.0	3,777	1,811	.522
1965	53.6	230.1	187.8	110.0	60.5	20.0	1.9	17.9	87.2	3,320	1,607	.504
1966	52.7	186.9	146.7	97.7	56.5	19.8	1.3	15.6	75.3	2,808	1,376	.477
1967	50.1	174.3	155.5	95.1	48.0	13.3	1.2	15.2	72.7	2,688	1,315	.449
1968	48.5	171.5	152.1	80.7	45.8	12.1	1.2	14.8	70.0	2,560	1,231	.419
1969	51.3	174.0	159.2	76.2	37.0	12.2	1.0	15.2	71.2	2,555	1,241	.393
NORTHEASTERN ONTARIO												
1961	85.9	297.0	243.6	160.3	91.2	33.3	2.0	31.1	138.4	4,567	2,251	.645
1962	85.5	295.5	242.4	159.5	90.7	33.1	2.0	30.2	135.3	4,544	2,235	.640
1963	69.8	284.3	240.1	153.8	86.7	30.9	2.1	28.3	127.2	4,339	2,103	.630
1964	61.2	272.6	232.1	146.2	81.8	30.2	2.4	26.7	119.7	4,133	2,023	.610
1965	62.3	233.5	199.4	129.8	74.0	27.2	2.5	23.5	105.3	3,644	1,809	.585
1966	63.6	200.9	168.7	106.9	58.6	21.0	2.3	20.3	90.7	3,110	1,530	.561
1967	64.0	193.2	153.0	93.4	54.1	17.1	1.4	19.4	85.5	2,881	1,395	.529
1968	61.6	198.0	143.0	84.1	44.3	17.5	1.2	19.0	82.9	2,749	1,359	.493
1969	59.3	190.6	156.5	83.7	46.6	14.5	1.0	19.5	84.0	2,761	1,341	.461
NORTHWESTERN ONTARIO												
1961	99.2	289.9	233.6	155.8	83.1	29.1	4.6	28.5	128.6	4,477	2,207	.585
1962	94.9	277.3	223.4	149.0	79.4	27.8	4.4	26.9	121.7	4,281	2,089	.582
1963	70.8	263.8	231.5	134.6	76.9	26.6	2.3	25.0	113.2	4,033	1,956	.573
1964	63.9	244.6	205.5	132.5	72.1	25.8	2.8	23.2	104.3	3,736	1,822	.555
1965	67.4	223.4	185.3	120.3	66.1	24.0	2.6	21.5	96.5	3,446	1,677	.533
1966	65.6	203.0	179.4	112.4	63.4	23.1	1.8	20.4	95.1	3,244	1,567	.509
1967	69.4	191.8	157.3	94.8	49.5	16.8	1.9	18.9	83.9	2,908	1,409	.479
1968	60.9	192.5	154.7	87.7	46.8	16.2	1.4	18.6	81.5	2,801	1,392	.447
1969	59.2	191.2	164.9	84.6	41.5	15.1	1.3	18.9	82.1	2,789	1,369	.418



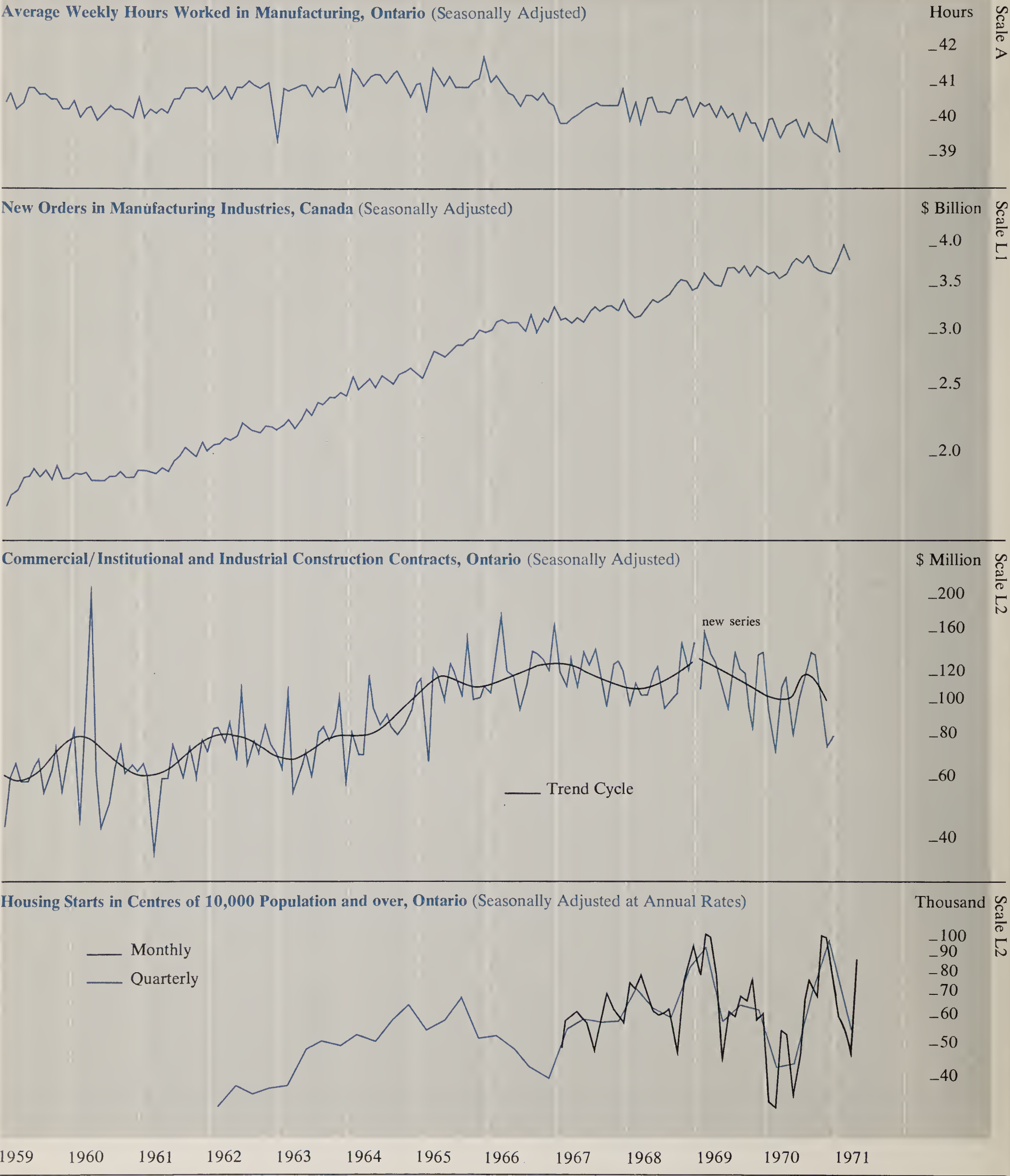
**Fertility Rates for Ontario Regions, 1961-1969**

Regions	Age Specific Rates							Crude Birth Rate	General Fertility Rate	Total Fertility Rate	Gross Reproduction Rate	Child/ Woman Ratio
	15-19	20-24	25-29	30-34	35-39	40-44	45-49					
TOTAL – ONTARIO												
1961	69.5	239.8	211.6	134.2	69.8	21.9	1.6	25.3	108.2	3,742	1,824	.508
1962	64.5	239.9	210.5	133.9	65.6	21.9	1.4	24.6	105.6	3,689	1,796	.511
1963	60.3	233.7	208.1	133.1	66.2	21.1	1.2	23.9	102.9	3,618	1,759	.508
1964	57.8	219.7	202.4	128.6	64.6	20.4	1.6	23.0	98.6	3,475	1,686	.499
1965	58.3	192.9	180.6	114.5	59.3	17.8	1.5	20.9	89.0	3,125	1,521	.486
1966	57.4	171.3	160.2	98.8	52.8	16.2	1.3	19.0	80.3	2,790	1,361	.467
1967	53.4	162.0	149.2	88.6	45.9	13.4	1.0	17.8	74.8	2,567	1,247	.427
1968	50.1	155.1	145.0	83.0	41.1	11.5	1.0	17.3	71.7	2,434	1,184	.398
1969	49.2	152.2	148.4	82.3	38.3	10.7	.8	17.5	72.0	2,411	1,174	.373



# Selected Economic Indicators

## Leading Indicators





## Leading Indicators

**Total Money Supply, Canada** (Average of Wednesdays, Seasonally Adjusted)

\$ Billion

\_35

\_30

\_25

\_20

\_15

Scale L1

**Toronto Stock Exchange Industrial Index** (1956 = 100, Not Seasonally Adjusted)

Index

\_200

\_180

\_160

\_140

\_120

\_100

Scale L2

## Coincidental and Lagging Indicators

**Gross National Product, Canada** (Quarterly, Seasonally Adjusted at Annual Rates)

\$ Billion

\_90

\_80

\_70

\_60

\_50

\_40

\_35

Scale L1

— Current Dollars

— Constant (1957) Dollars

new series  
constant (1961) dollars

**Average Hourly Earnings in Manufacturing, Ontario** (Seasonally Adjusted)

Dollars

\_3.50

\_3.00

\_2.50

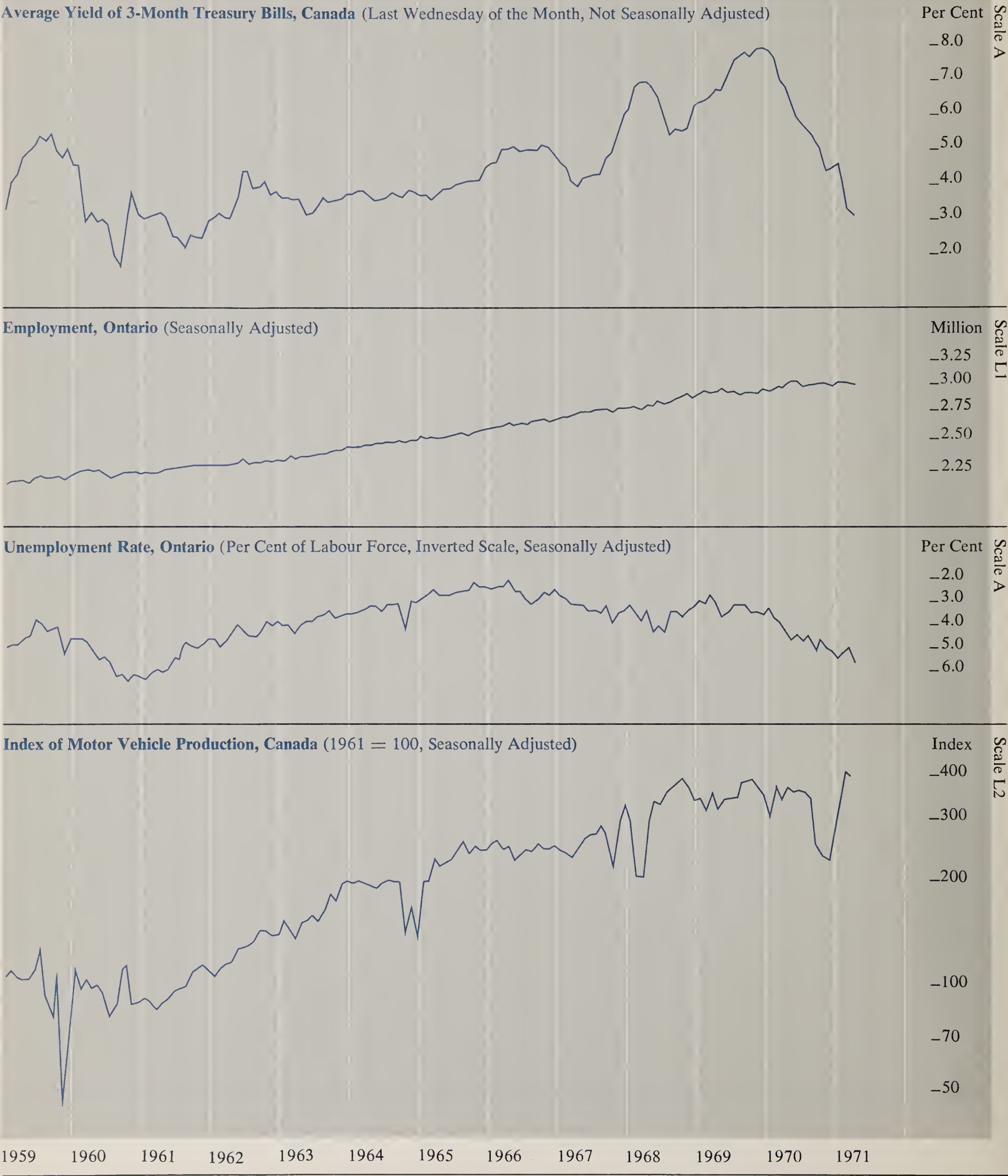
\_2.00

Scale L1

1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971



# Coincidental and Lagging Indicators





Seasonally Adjusted

	1970												1971											
	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April										
Leading Indicators																								
Average Weekly Hours Worked in Manufacturing																								
New Orders in Manufacturing Industries <sup>c</sup>	39.5	39.8	39.9	40.6	39.5	40.0	39.6	39.5	39.4	40.1	39.2	38.8	39.1											
Commercial/Institutional and Industrial Construction Contracts	3,682	3,795	3,771	3,852	3,804	3,883	3,754	3,697	3,689	3,686	3,885	4,034	3,859											
Urban Housing Starts (Annual Rate)	112.1	119.7	82.0	103.0	122.9	142.1	138.5	109.6	75.7	82.9														
Money Supply <sup>c</sup>	55,700	53,900	37,200	45,200	67,500	77,500	69,200	106,000	103,800	82,300	60,600	55,600	48,400	88,200										
T.S.E. Industrial Index <sup>u</sup>	28,850	28,997	29,260	29,629	29,812	30,042	30,194	30,624	31,197	31,696	32,135	32,511	33,130											
Business Failures <sup>u</sup>	185.17	171.08	154.21	151.53	157.36	160.28	165.8	162.1	168.7	174.4	178.1	177.4	185.3	181.6										
Business Failures — Liabilities <sup>u</sup>	82	54	65	77	73	48	55	71	74	71	71	70	100											
	4.0	2.2	3.4	8.1	3.1	2.8	5.3	8.1	5.8	7.7	11.6	4.5	5.2											
Coincidental and Lagging Indicators																								
Gross National Product <sup>c</sup> (Annual Rate)	82,684			83,824			84,988																	
Average Hourly Earnings in Manufacturing	3.13	3.13	3.17	3.21	3.22	3.22	3.18	3.21	3.22	3.33	3.37	3.40	3.41											
3-Month Treasury Bill Rate <sup>c,u</sup>	7.00	6.78	6.34	5.94	5.70	5.51	5.39	5.01	4.40	4.44	4.68	4.06	3.16	3.03										
Cheques Cashed in Clearing Centres <sup>l</sup>	6,661	6,487	6,313	6,386	6,358	6,774	7,184	6,945	6,475	6,553	6,589													
Retail Trade	884	906	904	887	918	902	930	896	903	910	900	941	947											
Labour Force	3,099	3,111	3,174	3,162	3,121	3,129	3,145	3,166	3,167	3,151	3,215	3,223	3,197	3,207										
Employed	2,977	2,978	3,035	3,025	2,976	2,996	3,003	3,030	3,020	2,996	3,042	3,054	3,040	3,023										
Unemployed	115	130	137	134	142	142	158	147	156	162	173	169	157	184										
Unemployed as % of Labour Force	3.7	4.2	4.3	4.2	4.5	4.5	5.0	4.6	4.9	5.1	5.4	5.2	4.9	5.7										
Wages and Salaries	1,550	1,547	1,571	1,586	1,584	1,601	1,596	1,600	1,611	1,619	1,646													
Index of Industrial Employment	132.7	132.1	131.7	131.4	131.1	131.7	130.2	130.0	129.7	132.0	132.1													
Index of Industrial Production <sup>c</sup>	171.5	172.4	170.5	170.2	170.0	171.0	169.1	168.6	171.5	170.5	171.7	172.4	172.1											
Total Manufacturing <sup>c</sup>	168.1	170.0	167.5	167.4	165.4	166.5	163.1	164.3	165.5	165.1	167.1	168.3	167.8											
Non-Durables <sup>c</sup>	152.8	154.8	155.0	152.4	152.8	151.8	152.2	152.0	155.3	152.9	152.7	150.0	150.2											
Durables <sup>c</sup>	186.7	188.6	182.8	185.8	181.7	184.4	176.4	179.9	178.4	180.6	185.3	191.5	190.2											
Mining <sup>c</sup>	170.6	164.2	166.6	170.8	173.4	174.6	178.2	175.4	186.7	180.9	177.4	176.4	176.3											
Electric Power and Gas Utilities <sup>c</sup>	203.0	206.4	203.7	205.1	206.1	205.9	208.4	195.0	194.8	201.0	203.2	201.8	201.8											
Primary Energy Demand (Annual Rate)	62.94	63.39	61.60	63.35	65.03	65.68	66.80	65.56	64.32	66.79	67.62	67.76	68.14											
Exports (including re-exports) <sup>c</sup>	1,410.1	1,439.0	1,434.1	1,392.2	1,422.7	1,321.1	1,391.3	1,416.0	1,479.8	1,312.0	1,440.0	1,391.0	1,503.0	1,392.0										
Imports <sup>c</sup>	1,242.6	1,191.6	1,207.1	1,182.5	1,187.5	1,162.3	1,184.5	1,006.0	1,138.0	1,020.0	1,128.0	1,182.0	1,339.0	1,178.0										
Unclassified Indicators																								
Foreign Exchange Reserves <sup>c,u</sup>	2,936	3,179	3,406	3,650	3,689	3,848	3,785	3,831	3,871	3,813	3,816	3,868	3,944											
Industrial Materials Price Index <sup>c,u</sup>	275.7	274.4	273.7	271.5	270.3	268.5	269.2	267.4	266.4	264.2	264.2	266.0	266.4											
Consumer Price Index <sup>c,u</sup>	128.9	129.7	129.6	129.9	130.5	130.5	130.2	130.3	130.3	129.8	130.3	130.9	131.3	132.2										

<sup>c</sup>Statistics for Canada.

<sup>u</sup>Not seasonally adjusted.

<sup>l</sup>Ontario less Toronto.



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May	Canada and the Exchange Rate
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Nov.	The Forest-Based Industries of the Northeastern Ontario Economic Region
Dec.	Economic Developments in the Department of Highways

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## 1965

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Mar.-Apr.	Price Changes 1961-1970: An Economic Analysis



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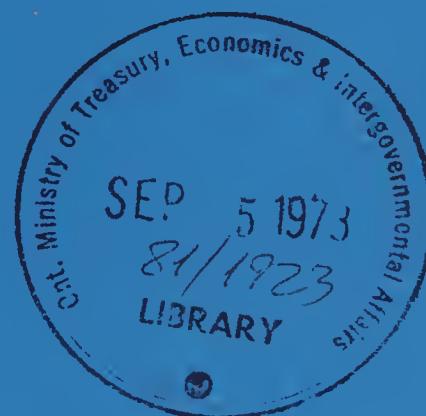
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July/August 1971  
Volume 9, Number 4

Department of Treasury and Economics

Hon. W. Darcy McKeough, Treasurer of Ontario  
and Minister of Economics  
H. Ian Macdonald, Deputy Minister



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1971  
VOL. 9  
NO. 4



# Ontario Economic Review

July/August 1971  
Volume 9, Number 4

## The Ontario Economy

## Provincial-Municipal Reform: A Progress Report

Taxation and Fiscal Policy Branch,  
Department of Treasury and Economics

## Selected Economic Indicators

A publication of the  
Department of Treasury  
and Economics  
Government of Ontario

Hon. W. Darcy McKeough  
*Treasurer of Ontario and  
Minister of Economics*  
H. Ian Macdonald  
*Deputy Minister*

The *Ontario Economic Review* is prepared and edited bimonthly in the Economic Analysis Branch of the Economic and Statistical Services Division, Department of Treasury and Economics. The review presents articles of interest as well as current information on economic activity in Ontario. Signed articles reflect the opinions of their authors and do not necessarily represent the views of the Department.

Subscriptions can be obtained free of charge by writing the Editor, *Ontario Economic Review*, Department of Treasury and Economics, Frost Building, Queen's Park, Toronto 182, Ontario.

### About the Review

The feature article for the July/August edition of the *Ontario Economic Review* is based on Budget Paper B, Provincial-Municipal Reform: A Progress Report, contained in the 1971 Annual Budget Statement of the Hon. W. Darcy McKeough, Treasurer of Ontario and Minister of Economics.

The article provides a complete progress report of the Ontario government's long-term program of reform in provincial-municipal finance and property taxation. Property tax increases between 1967 and 1970, for example, decelerated to almost one-half their annual rate of growth in 1960-67, and in 1971 no increase in education taxes and only a moderate increase in municipal taxes is expected. This substantial improvement has been due almost entirely to increased provincial grants. Without this ongoing shift in financing from local governments to the Province, an additional \$461 million in property tax revenues would have been required to maintain local services in 1971-72. New reform measures in 1971-72 will require \$78 million.

The article was prepared under the direction of Dr. T. M. Russell in the Taxation and Fiscal Policy Branch, Policy Planning Division of the Department of Treasury and Economics.

### Indicator Charts, Pages 17-19

Fluctuations in aggregate economic activity — commonly used to define business cycles — do not necessarily correspond with fluctuations in the individual activities which make up the aggregate. Instead different indicators of economic activity may vary with respect to both their rates of growth and the timing of their peaks and troughs: some may grow more rapidly than others, some change direction sooner.

Those activities which tend to assume a direction in advance of the aggregate — because they relate to future rather than present production — are referred to as leading indicators, and are widely used to anticipate the short-run future course of the overall economy. The charts on pages 17-19 in the *Ontario Economic Review* present a number of these leading indicators, as well as several which are coincidental to or lag behind the aggregate, to provide for the reader an opportunity to make such an evaluation.

While comparisons of the timing and direction of general changes in the various indicators can readily be made, great care must be exercised in making such a comparison of the amplitude of fluctuations. Of the three vertical scales used — 'A' (arithmetic) and 'L 1' and 'L 2' (logarithmic scales with one and two cycles respectively over a given vertical distance) — only the logarithmic scales can be used to compare relative changes in different indicators. *And this applies only when all series being compared are on the same logarithmic scale.* In such a situation all parallel lines represent equal rates of growth, the exact rate of growth being determined by the slope of the line.



## 1971 FEDERAL BUDGET AND TAX REFORM BILL

The 1971 federal budget, together with the government's tax reform proposals was presented to the Canadian Parliament by Finance Minister E. J. Benson on June 18, 1971. The budget is intended to be expansionary, to restore business confidence and accelerate consumer spending as soon as possible. Moderate tax relief and an escalation of the federal budgetary deficit to three-quarters of a billion dollars are the key features.

Highlights of the budget include:

- Basic individual tax exemption increased to \$1,500 from \$1,000 and to \$2,850 from \$2,000 for married couples, effective Jan. 1, 1972;
- Capital gains tax to be imposed at personal tax rate of one-half of the gains, with half of any losses deductible;
- Federal gift and estate taxes abolished Dec. 31, 1971;
- General corporation tax rate to be imposed at 50 per cent in 1972, reducing in stages to 46 per cent in 1976;
- Child-care expenses to be permitted as deductions up to \$500 for each child under 14, to \$2,000 maximum per family; special exemption of \$650 to be granted to those 65 or older, the disabled and blind, replacing \$500 exemption at age 70;
- Deduction of up to \$150 a year to be permitted as employment expense without receipts;
- Limits raised on deductions to be permitted for pension and retirement plan contributions;
- Corporations to be permitted to deduct interest paid on borrowings to buy shares in other corporations;
- Three-year holiday for new mines and other allowances to be abolished in stages and replaced by earned depletion and other tax concessions;
- Unrealized capital gains to be taxed at taxpayer's death, but private houses exempted;
- Small businesses to be taxed at 25 per cent on the first \$50,000 of income;
- Tax dividend credit for shareholders of Canadian corporations to be increased to one-third from 20 per cent;
- Three per cent surcharge on personal and corporate income taxes to be removed July 1;

- Fifteen per cent excise tax removed immediately on television, radio, hi fi and other electronic equipment;
- Taxpayers with less than \$500 taxable income exempted from tax, effective July 1, 1971;
- Guaranteed income supplement payments to old age pensioners removed from taxable income retroactive to Jan. 1, 1971;
- Budgetary deficit for fiscal 1971-72 estimated at \$750 million on revenue of \$13.66 billion and expenditures of \$14.41 billion.

The Tax Reform Bill presented by Finance Minister Benson represents a major change from the proposals advanced in the 1969 white paper on tax reform. Almost every proposal that had met with substantial opposition has been altered. The key proposals of the white paper — the integration of personal and corporation taxes, taxation of capital gains at full rates, five-year revaluation of common shares, and the intended distinction between widely held and closely held corporations have been eliminated as has the plan to allow small corporations to be taxed as a partnership. The following summary outlines the major features of the new Tax Reform Bill:

### Capital Gains

One-half of capital gains will be included in income and taxed at normal personal or corporate rates. One-half of capital losses will be deductible by all taxpayers against one-half of capital gains. Individual taxpayers may also deduct up to \$1,000 of capital losses against other income. The deductions may be made in the current year, preceding year or in any number of subsequent years until losses are fully absorbed. Generally, gains will be taxable and losses deductible when the asset is sold, given away as a gift or upon the death of the taxpayer. Capital gains will be deferred on gifts or bequests between spouses.

Valuation day will be announced after it has passed, in order to avoid speculation. Only gains after valuation day will be taxed and then only if the realization occurred after 1971. Valuation day will have no application to an asset acquired after the new system commences. No taxpayer will be required to report any information to the Department of National Revenue on valuation day. Gains and losses at the start of the system will be measured against the actual cost of assets or their value on valuation day.

Only real gains after the start of the new system will be taxed and similarly, only real losses will be deductible. For example, a decline in an asset's value which is a return to its original cost will not be deductible.

Gains on the sale of a taxpayer's principal residence (but not on the sale of second homes such as cottages), together with up to an acre of surrounding land will be exempt. More than one surrounding acre may qualify for exemption if the owner proves that the land is needed for use and enjoyment of his residence.

As an alternative to the complete exemption of a farmers house and one acre, he may choose a \$1,000 annual deduction from gains on the sale of his house and all his farm property.

No tax is to apply where the proceeds from the sale of personal property are less than \$1,000. Where the proceeds exceed \$1,000, the greater of \$1,000 or the cost of the assets may be deducted from the proceeds and record keeping will not be required.

### Corporations and Shareholders

The basic features of the present system of taxing corporations and their shareholders have been retained, with some modifications. The White Paper proposal of an integrated system will not be established.

The general rate of tax is to be 50 per cent in 1972. This will be reduced annually by one percentage point to 46 per cent in 1976. The Canadian-controlled private corporation is to be taxed at the rate of 25 per cent on the first \$50,000 of business income. ("Business income" being defined as profit from active financial commercial, industrial or professional business). The low rate will cease to apply once a corporation has accumulated taxable income of \$400,000. This accumulation is calculated by adding each year's taxable income after the start of the new system and by deducting four-thirds of taxable dividends paid to shareholders. This deduction cannot be made for dividends which occasion a refund. The present rules for determining associated corporations are retained to assure that the low rate is not applied to more than \$50,000 of business income by a group of selected companies.

When income taxed at the low rate is used by the corporation for non-business purposes, for example, investment in marketable securities, an additional tax is payable at the rate of one dollar for each two dollars so used. This tax would be refunded when the funds



are reinvested in business assets or paid out to shareholders as dividends. Cash and short term notes are not included as ineligible investments and will not attract this special tax.

Dividends received by a public corporation from another corporation continue to be tax exempt unless paid out of a designated surplus of a controlled corporation.

Dividends received by a private Canadian corporation from another Canadian corporation are subject to two rules:

- (1) dividends from controlled corporations (more than 50 per cent ownership), and
- (2) dividends from portfolio investment (ownership less than 50 per cent).

Dividends under (1) are tax exempt unless:

- (a) they are paid out of designated surplus, in which case the recipient is taxable, or
- (b) the dividend paid by a controlled corporation results in that corporation qualifying for a refund of tax in which case the receiving corporation pays a special fully refundable tax equal to the refund.

Dividends under (2) are subject to a special 33.33 per cent fully refundable tax.

One-half of a capital gain realized by a private corporation is to be included in its income and one-half is to be placed in a capital gains surplus account. Distributions out of that account are to be tax free. Tax paid on the one-half of the capital gain which was included in income is refundable to the corporation when it pays dividends.

Simplified rules for distributing corporate surplus are introduced, by allowing the directors to specify the type of surplus out of which a cash dividend may be paid. After the start of the new system, corporate surplus will consist of (1) "1971 undistributed income on hand", (2) "1971 capital surplus", (3) one-half of capital gains realized after the start of the system, and (4) the remaining balance made up of after tax income earned since the start of the system and differences between "tax" income and "accounting" income. A special tax of 15 per cent may be paid on all or any part of (1) above, the remaining 85 per cent can then be distributed tax-free. This distribution would reduce the opening value of the shares for capital gains tax purposes. Capital gains relating to pre-1972 transactions can also be distributed tax-free. This distribution

will similarly reduce the opening value of the shares.

In the area of business and property income the following entertainment and related expenses are to be disallowed: amounts paid to maintain or operate a yacht, camp, lodge or golf course facility; membership fees or dues in clubs which provide principally dining, recreational, or sporting facilities for members. Allowed expenses include reasonable entertainment expenses and conventions (two per year if at a location consistent with the territorial scope of the organization).

The present system of depreciation is to continue with the following modifications:

- (1) When a depreciable asset is bequeathed to someone other than the spouse the beneficiary takes over the property half-way between fair market value and original cost as a depreciation.
- (2) Each rental building costing \$50,000 or more will be placed in a separate capital cost allowance class for recapture and terminal loss purposes.
- (3) A loss created by capital cost allowance on the rental of real property may reduce other rental income but not normal rental income.
- (4) Carrying charges (interest and property taxes) on undeveloped real property will not be deductible from other income where the property is being held as an investment.

These charges will be added to the cost of the property.

Taxpayers in the professions will be required to report income and expenses on an accrual basis for fiscal years ending after December 31, 1971. Because of the difficulty in valuing unbilled time, work in process need not be brought into income unless the taxpayer chooses to do so. Accounts receivable at the start of the new system will be brought into income over a number of years, but at least 10 per cent of such deferred income must be taken into earnings each year on a cumulative basis.

For farmers and fishermen basic herd and straight line depreciation is to be phased out. Livestock farmers will be able to establish a basic herd at December 31, 1971 and any gain thereon will be tax free. No additions to the basic herd may be made after that date. When livestock is sold after December 31, 1971, the sale may be considered as out of

the basic herd or the other herd, subject to special rules.

For hobby farmers the present \$5,000 limitation will continue. In addition, any amounts of interest and property taxes not deducted because of this limitation may be applied to reduce any proceeds on eventual sale of the farm.

### Personal Income

Existing special taxes and deductions are to be replaced by a single schedule. These include the old age security tax of four per cent, the social development tax of two per cent and the special tax reduction on basic tax limited to \$20. The four per cent tax on foreign investment income is to be cancelled and the three per cent surtax will not apply in 1972.

Provincial taxes are to be calculated as a percentage of total federal tax. The new standard rate of provincial tax will be 30 per cent of total federal tax.

The result of the new rate schedule and a standard 30 per cent provincial tax will be combined rates ranging to 61.1 per cent.

All taxpayers claiming the married exemption and with income solely from wages and salaries will pay less tax than at present. Taxpayers claiming the single exemption with only employment income, will pay less tax on incomes under \$8,000. No single status taxpayer above this level will have a tax increase of more than \$78 on his employment income.

A number of new items are to become taxable. To be taxed as income are:

- (a) one-half of capital gains;
- (b) payments under an income maintenance insurance plan to which the employer has made a contribution, the contributions made by an individual since 1967 to be deductible from any payment he receives;
- (c) allowances paid under the Adult Occupational Training Act, not including the portion for personal or living expenses while away from home for his training;
- (d) allowances paid under the Textile and Clothing Board Act;
- (e) scholarships, fellowships and bursaries, with a \$500 exemption; and
- (f) amounts contributed on an employee's behalf under a public medical care plan.



Employees receiving unemployment insurance benefits for part of a year may have earned substantial income during the rest of the year. Benefits received are to be taxable and contributions are to be deductible.

Personal exemptions are to be raised to \$1,500 from \$1,000 for a single taxpayer, and to \$2,850 from \$2,000 for a married taxpayer.

The existing formula for reducing the married exemption as the wife's income increases is to be changed. If a wife has income of more than \$250 a year, her husband will reduce the \$1,350 exemption claimed for her by one dollar for each dollar of the excess. If she has income of \$1,600 or more, both husband and wife will file as if they were single.

An unmarried person, including a widow or widower, can claim the married exemption for supporting a brother, child or other relative if that person lives in the taxpayer's home. A taxpayer claiming the married exemption in these circumstances cannot claim the \$300 or \$550 deduction for the dependant as well.

The \$300 exemption for dependants under age 16 and \$550 for dependants 16 and over will be maintained. However, the \$300 exemption will be reduced by one dollar for each two dollars of the dependant's income in excess of \$1,000. The \$550 exemption will be reduced by one dollar for each dollar that the dependant's income exceeds \$1,050.

The special exemption of \$500 for individuals age 70 and over will be increased to \$650 and will be made available to all taxpayers age 65 and over.

The special deduction of \$500 for individuals who are blind or confined to a bed or wheelchair is to be increased to \$650.

The standard deduction of \$100 for medical expenses and charitable donations is to be continued.

Amounts contributed by an employer on behalf of his employees to a public medical care plan will be a taxable benefit to the employee. This will not include payments for retired employees.

Medical expenses for which an individual has been reimbursed under an insurance plan are not to be treated as medical expenses.

Premiums paid by an individual to non-government medical or hospital plans are to be classed as deductible medical expenses.

The list of deductible medical expenses is to be increased to include payments to a school or other institution for the care and

training of mentally or physically handicapped or disabled persons, including those with special learning disabilities.

There is to be a deduction for child care expenses of up to \$500 for each child under age 14, with a maximum of \$2,000 per family. This is in addition to the general deduction for children as dependants and will normally be claimed by the mother.

A deduction is to be permitted for expenses of caring for a child over age 14 and who is dependent because of mental or physical infirmity.

The deduction may be taken by the father if he is a widower, or divorced or separated. He may also take the deduction if the mother is incapable of caring for herself or children, or if she is confined for 14 days or more to a bed, wheelchair, hospital, mental hospital or prison. For such periods the father's deduction is to be limited to a maximum of \$15 per week for each child to a total of \$60 per week, subject to the overall limitations of \$500 per child or \$2,000 per family.

Qualified child care expenses include baby-sitting costs, day nursery care, and up to \$15 a week (not exceeding \$500 a year) towards lodging paid at schools and camps. Amounts paid to dependants of the taxpayer or to relatives under age 21 will not qualify. Receipts bearing the social insurance number of the individual who performed the services must be retained.

The child care expense deduction cannot exceed two-thirds of the earned income of the parent making the deduction.

A deduction for employment expenses of up to three per cent of income from an office or employment, to a maximum of \$150 a year, is to be permitted. No receipts are to be required.

The employment expense deduction is not to be permitted to a salesman, who may deduct expenses incurred in earning commissions. An individual who holds an elected office may take the deduction only to the extent that it exceeds any tax-free expense allowance he may receive. Elected members of school boards, boards of education and other elected officers may exclude one-third of their total remuneration as an expense allowance in the same way as members of provincial legislatures and elected municipal officers.

Income for purposes of the employment expense deduction is to include wages, salary and taxable benefits received from an em-

ployer, and adult training allowances and research grants. It is not to include income from a pension or retirement plan, remuneration as a corporation director or unemployment insurance benefits.

### Finance Ministers Meeting — July 12-13

In a recent statement to the Ontario Legislature the Hon. W. Darcy McKeough reported briefly on the topics discussed and the progress made at the latest federal-provincial meeting of the Ministers of Finance. Tax reform, the economic situation and intergovernmental fiscal arrangements were the major items on the Ontario agenda.

On tax reform, Mr. McKeough presented a statement outlining Ontario's views and reactions to present on the new federal income tax legislation. In his statement the Minister raised four major concerns about the content and thrust of the federal tax reform program:

- The new federal tax system does not go far enough towards providing incentives to encourage greater Canadian investment and participation in Canadian businesses. Ontario therefore, is prepared to do more along these lines on its own, with its own taxes.
- The complete withdrawal by the federal government from gift and death taxation beginning in 1972 raises serious problems of equity and revenue maintenance for the provinces. Ontario's concerns about this potential gap in the Canadian tax structure were shared by all the other provinces. Accordingly, it was agreed to refer this matter and the similar matter of provincial resource taxation to the Continuing Committee of Officials to explore ways in which future provincial tax actions could be harmonized.
- The new federal legislation persists with the exemption approach to tax relief rather than adopting the more imaginative and effective method of tax credits. Yet, nearly all provinces are in favour of the tax credit approach, which was advanced and fully documented in Ontario's papers and studies on national tax reform. Mr. Benson agreed, however, to look at this matter, particularly the possibility of incorporating provincial tax credits within the national tax collection machinery. The Ontario Department of Treasury and Economics will be setting out complete



details of the kind of property tax and sales tax credits Ontario favours and exploring with the federal government ways to implement such a credit system within the new income tax framework for the benefit of Ontario taxpayers.

- The new federal tax reform appears to have been designed completely independently of related reforms in unemployment insurance and family allowances. Since it is the combined impact of reforms in all three areas which determines the incidence of burdens and benefits on Canadian families, Ontario has strongly urged an integrated and coordinated overall approach to reform. The apparent failure by the federal government to follow this logical approach has produced a number of serious anomalies in overall incidence as well as significant disincentives for families to earn more income at some points on the income scale. These equity anomalies and disincentive effects were documented at the meeting by Ontario in a short paper containing pertinent tables and examples. Mr. Benson has agreed to study the Ontario paper and any further

details on this important consideration which are brought forward.

The second important agenda item dealt with the state of the economy. Mr. McKeough summarized Ontario's views in a short statement to the conference. Essentially, the Province's assessment indicates that the economy is moving on a recovery path, but that this recovery will take place only gradually. Comments by the federal Minister of Finance appear to confirm this assessment. Mr. Benson, however, would not set out what are the federal targets for full employment and optimal economic performance over the next 18 to 24 months, even though this was explicitly asked for by some provinces. There was a general concern about the value of the Canadian dollar and its depressing effect on industrial sectors reliant upon exports, such as the pulp and paper industry.

Major discussion of fiscal arrangements centred around a new equalization arrangement for the coming five years. Mr. McKeough reiterated Ontario's basic support for this important program to help poorer provinces but called attention to two related considerations:

- a) Huge federal equalization payments to poorer provinces are largely financed out of Ontario and this has created a large fiscal drag on our economy. The total federal withdrawal from Ontario probably exceeds \$2.3 billion this year.
- b) The federal equalization program should be integrated with and take into account other federal programs directed to poorer provinces, particularly the regional economic expansion program which now spends over \$400 million per year towards this objective.

In any case it was agreed to recommend to the First Ministers that a new five year equalization agreement be approved, incorporating a number of technical improvements over the existing formula.

There was little discussion on other aspects of fiscal arrangements, such as the post-secondary education fiscal transfer and cost-sharing programs generally. It was agreed to refer these matters and the matter of health and welfare joint programs to the First Ministers, although they are to be discussed at another meeting of Finance Ministers prior to the meeting of Prime Ministers.



Taxation and Fiscal Policy Branch,  
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I INTRODUCTION

Increasing demands for social and economic services and facilities in recent years have strained severely the financial resources of provincial and local governments. To meet these pressures, the Government presented a comprehensive plan for controlling the level and distribution of provincial-municipal tax burdens in its white paper of 1969.<sup>1</sup> This plan involved a series of complementary actions across the broad spectrum of federal-provincial-municipal taxation and finance.<sup>2</sup> At the provincial-municipal level, it was designed to meet three main objectives.

- Relieve the growing pressure on the property tax by increasing grant support to municipalities and school boards, removing property tax exemptions and taking over the local government responsibilities for the administration of justice and assessment.
- Improve the progressivity of the provincial-local tax structure directly by the introduction of tax rebates to residential property owners, followed by selective relief to needy pensioners and farmers; and indirectly by increasing grants, thus financing a larger proportion of local government expenditures through the more progressive provincial tax system.
- Re-organize and consolidate local governments to provide them with an effective capacity for planning, to reduce disparities in tax bases between municipalities, and to improve effectiveness in the delivery of municipal services.

By 1970-71 the value to local governments of the Province's reform measures had grown to an equivalent of \$352 million a year. The amount of \$352 million comprises \$172 million in property tax rebates, \$131.7 million in increased grants, \$41.1 million in reduced local expenditure responsibilities and \$7.5 million generated by the removal of property tax exemptions on university properties and mineral processing facilities. In addition, natural growth increased basic grants by \$951 million from \$329 million in 1960 to \$1,280 million in 1970. The value of both the reform measures and the basic grant system will, of course, continue to grow each year. In 1971-72 the value of the reform package alone will increase to \$461 million.

These reforms have had two important effects. First, they have slowed the annual increase in property taxes in the period

Table 1 – Local Government Expenditures for Selected Years<sup>1</sup>  
(\$ million)

Year	School Board Expenditures	Municipal Expenditures	Total Local Government Expenditures
1960	522	625	1,147
1967	1,278	1,123	2,401
1968	1,510	1,280	2,790
1969	1,714	1,354	3,068
1970 (est.)	1,950	1,530	3,480
Increase in Expenditures 1960-70	1,428	905	2,333
Share of Total Increase	61%	39%	100%

Source: See Appendix, Table A.

<sup>1</sup>Expenditures include current operating costs plus capital expenditures.

1967-70 to almost half the rate for the first seven years of the decade. Second, they have reduced property tax burdens on residential taxpayers, especially needy pensioners and farmers, relative to commercial and industrial properties, thus increasing the overall progressivity of the provincial-local tax system. This article describes in detail and quantifies these two important effects. In addition, it discusses future directions and policies of Ontario's provincial-municipal reform program.

II PROVINCIAL-LOCAL FINANCE,  
1960-70

This section describes the growth and composition of local government expenditures during the 1960s and the steadily increasing role played by provincial grants in financing those expenditures as a result of Ontario's reform program. The change in the structure of finance has resulted in a marked slowdown in the upward trend of property tax levies and rates between 1967 and 1970. Also included in this section is a brief analysis of the value of the total reform package in reducing potential tax levies and rates. Finally, to put the growth of property taxes in an economic and financial perspective, they are compared with Ontario's Gross Provincial Product and provincial-local revenues in Ontario and other provinces.

Structure and Expansion of Local Expenditures

In the past decade local government expenditures more than tripled from \$1,147 million

to an estimated \$3,480 million. Expenditures include both current operating costs and capital expenditures incurred by local governments. A breakdown of these expenditures between the two main spending units of local government – school boards and municipalities – is shown in Table 1.<sup>3</sup> School board expenditures increased about 2.7 times while municipal expenditures increased 1.4 times over the decade. Sixty-one per cent of the \$2,333 million increase in local expenditures was accounted for by school board expenditures.

<sup>1</sup>Hon. C. S. MacNaughton, "The Reform of Taxation and Government Structure in Ontario", Ontario Budget 1969, Budget Paper B, (Toronto: Department of Treasury and Economics). This white paper followed the extensive examination of provincial-municipal finance in the Report of the Ontario Committee on Taxation, (Toronto: Queen's Printer, 1967) and Select Committee of the Legislature, Taxation in Ontario: A Program for Reform, (Toronto: Queen's Printer, 1968).

<sup>2</sup>Ontario's views on federal-provincial tax reform are developed further in Hon. C. S. MacNaughton, Ontario Proposals for Tax Reform in Canada, and Staff Paper, Effects of Ontario's Personal Income Tax Proposals, Ontario Studies in Tax Reform 2, (Toronto: Department of Treasury and Economics, 1970 and 1971). The connection between federal-provincial and provincial-municipal tax reform is discussed further in Section IV, below.

<sup>3</sup>Included in the municipal category are expenditures of conservation authorities and children's aid societies. Excluded are expenditures of municipal enterprises such as electric and water utilities whose annual expenditures were estimated to be in excess of \$500 million during the early 1960s.



This expenditure growth is the result of dramatic changes in a few key cost and demand components. Growth in school board expenditures reflects primarily increases in the average salary of teachers, capital expenditures and enrolment increases.<sup>4</sup> The major components of increases in municipal expenditures were public works (mainly road construction and maintenance), protection to persons and property, and social assistance.<sup>5</sup>

Financing Local Government Expansion

Local government expenditures, as shown in Table 2, increased by \$2,333 million between 1960 and 1970. Ontario Government grants have financed 54 per cent of the increase. A further 36 per cent has been financed by increases in net property tax levies<sup>6</sup> and the other 10 per cent through miscellaneous revenues and borrowing.

The impact of the reform program which started in 1968 is reflected in the growing importance of grants. In the 1967-70 period, 58 per cent of the increase in expenditures was financed by grants as compared with only 50 per cent in the period 1960-67. Nine per cent of the expenditure increase in the 1967-70 period was financed by borrowing

<sup>4</sup>Between 1960 and 1968 the relative contributions to increases in school board expenditures were as follows:

Increase in average salary (including superannuation) of teachers	25%
Capital expenditures	21%
Enrolment increases	19%
Plant operation, supplies, administration, etc.	18%
Decrease in pupil/teacher ratio	9%
Transportation and interest	8%
Total Increase in School Board Expenditures, 1960-68	100%

<sup>5</sup>Between 1960 and 1969 the relative contributions to increases in municipal expenditures were as follows:

Public works (roads etc.)	26%
Protection to persons and property	20%
Social welfare	16%
Sanitation and waste removal	10%
General government	8%
Interest charges	6%
Health	2%
All Other	12%
Total Increase in Municipal Expenditures, 1960-69	100%

<sup>6</sup>Net property taxes equal taxes levied by local governments less Ontario Government tax rebates.

which was facilitated in large measure by the Ontario Education Capital Aid Corporation, the Ontario Municipal Improvement Corporation, and the Ontario Water Resources Commission. As grants and borrowing assumed increasing importance, the role of property tax levies in financing expenditure increases declined from 45 per cent in the earlier period to 26 per cent in the later period.

The increasing importance of grants is clearly illustrated in Table 3 and Figure 1. The Province's support of local government expenditures over the decade increased from 28.7 per cent in 1960-61 to 39.8 per cent in 1967-68. By 1970-71 provincial grants had reached a level of 45.5 per cent of local government expenditures. Support to municipalities increased most dramatically in the 1967-70 period.

During the same period, the Province also achieved a steady improvement in its degree of support of school board expenditures. On

the standard basis, support to school boards increased from 43.9 per cent to 50.8 per cent in the 1967-70 period. It should be noted that this percentage increase differs from that shown in Table 3 where the calculation includes capital expenditures in base and vocational school grants plus the Province's contribution to the teachers' superannuation fund in the amount of support. Moreover, the grants data in Table 3 are for fiscal years ending March 31, whereas the standard basis uses calendar year data. Table 4 illustrates the increases in school board support in the 1967-70 period using various measures of provincial grants and school board expenditures. On the broadest definition of provincial support and school board expenditures, the Province's level of support rose from 46.8 per cent in 1967 to 54.3 per cent in 1970. Whichever measure is used, however, it is apparent that the Province's support has increased substantially since 1967.

Table 2 — Increases in Annual Expenditures, Revenues and Borrowing of Local Government

	1960-70		1960-67		1967-70	
	(\$ million)	(%)	(\$ million)	(%)	(\$ million)	(%)
Tax Levies	843	36	560	45	283	26
Other Revenue	169	7	94	7	75	7
Grants	1,254	54	626	50	628	58
Borrowing <sup>1</sup>	67	3	—26	—2	93	9
Expenditures	2,333	100	1,254	100	1,079	100

Source: See Appendix, Table A.

<sup>1</sup>Due to year-to-year fluctuations, increases do not reflect true trends in borrowing.

Notes: Data in this table are based on the assumption that all Ontario Government tax rebates are allocated to school boards and municipalities in proportion to their respective 1969 gross tax levies. Totals may not add due to rounding.

Table 3 — Provincial-Local Grants Expressed as a Percentage of Local Government Expenditures, Selected Years

	1960-61	1967-68	1970-71 <sup>3</sup>
School Board Grants <sup>1</sup> /Expenditures	33.9	48.3	53.2
Municipal Grants <sup>2</sup> /Expenditures	24.4	30.0	35.6
Total Grants/Expenditures	28.7	39.8	45.5

Source: See Appendix, Table A.

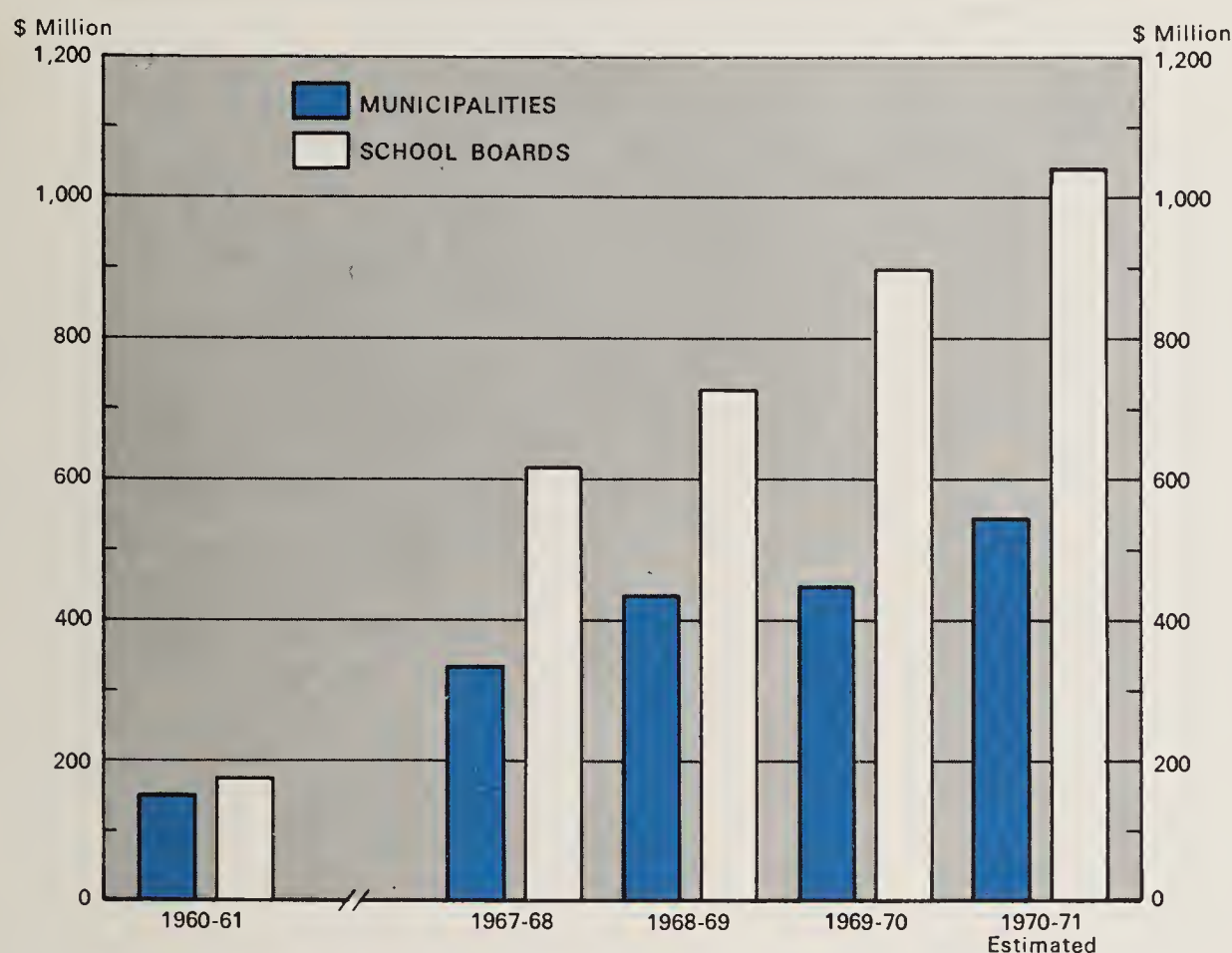
<sup>1</sup>Includes 52 per cent of the residential property tax rebates and tax rebates to farmers and pensioners.

<sup>2</sup>Includes 48 per cent of the residential property tax rebates and tax rebates to farmers and pensioners.

<sup>3</sup>Estimated.

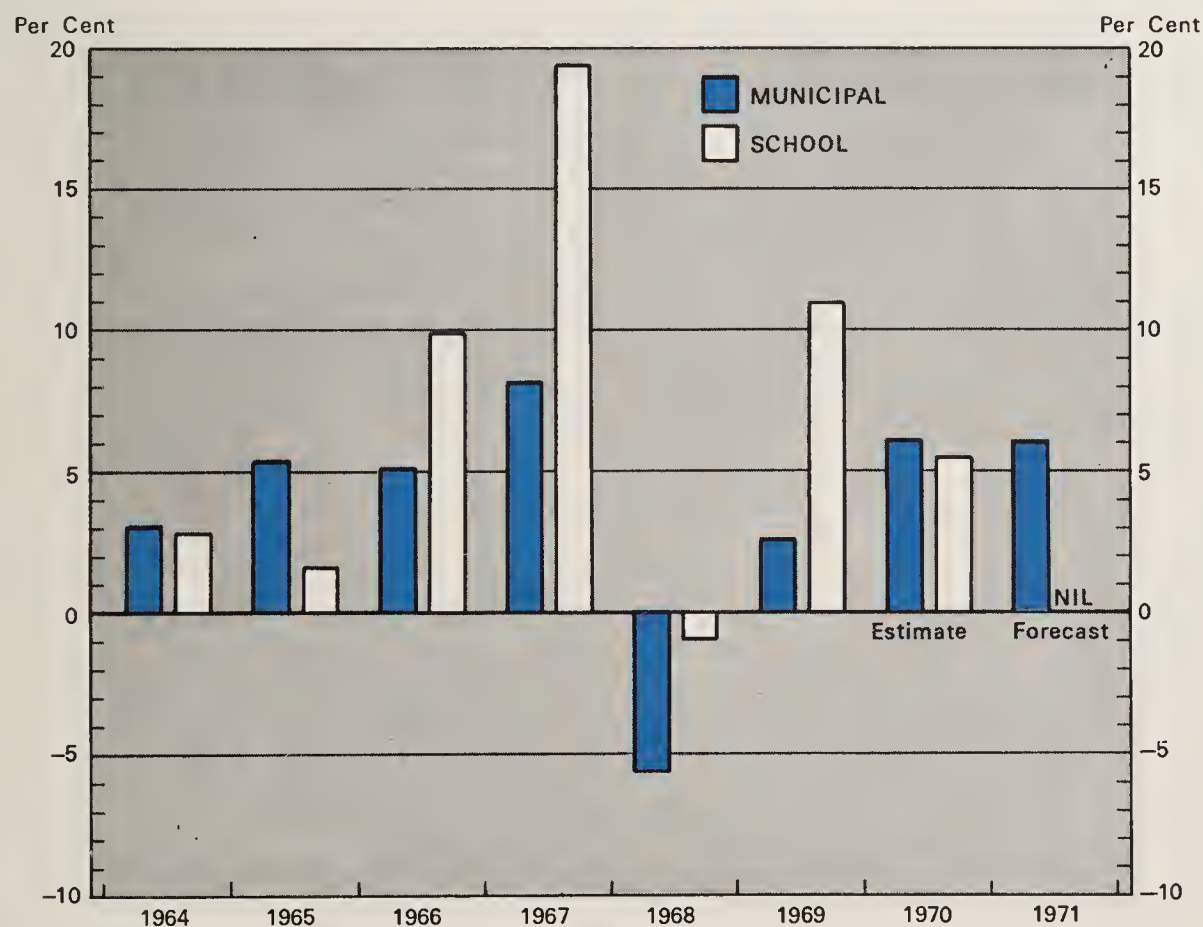


**Figure 1 — Provincial Government Grants to Municipalities and School Boards, Selected Years**



Source: Ontario Public Accounts, 1961-1970 (Toronto: Queen's Printer).

**Figure 2 — Annual Percentage Changes in Net Property Tax Rates, 1964-71**



Source: See Table 5.

### Growth in Property Tax Bases, Rates and Levies

The other main financing component of local government expenditures is the property tax. During the 1960s net property taxes grew by 148 per cent from \$571 million to \$1,414 million.<sup>7</sup> This growth includes a relatively greater increase in school property taxes. In fact, net school taxes grew by 184 per cent whereas municipal net taxes grew by 118 per cent.

It was pointed out earlier how property taxes declined in importance relative to grants in the 1967-70 period. The significance of this decline is seen in Table 5 where it is shown that the rate of growth of property tax revenues decelerated from 10.3 per cent annually during the 1960-67 period to 7.7 per cent annually in the past three years. When this decline is translated into effective tax rates, the change is even more dramatic.<sup>8</sup> From 1960 to 1967, local effective tax rates rose on average by 5.4 per cent annually; in the past three years, 1967-70, this trend decelerated to 3.0 per cent annually. Slower growth in municipal tax rates accounted for most of this overall improvement, although school tax rates have also decelerated since 1967. The annual percentage changes in effective tax rates facing Ontario taxpayers are depicted in Figure 2, along with forecasts for 1971. On the information available to date, it would appear that school tax rates will not increase in 1971 and may even show an absolute decline. Municipal tax rates, on the other hand, are likely to rise at about the long-term average rate for the past decade.

### Impact of Reforms on Tax Rates and Levies

The quickening in overall grant support to local government is a direct result of provincial reform moves which started in 1968. These are shown in Table 6. The value of these provincial reforms amounted to \$352 million in 1970. Without this large shift of funds from the Province to local governments, tax levies would have grown from \$1,131 million in 1967 to \$1,766 million in 1970, rather than the \$1,414 million that was actually collected. This would have required property tax increases of 10.9 per cent per year as compared with the increase of 3.0 per cent that actually occurred.

### Property Tax Growth in Perspective

The rapid growth in property tax levies is more meaningful when put in the context of society's ability to pay taxes, as measured by

<sup>7</sup>Net property taxes equal taxes levied by local governments less Ontario Government tax rebates.

<sup>8</sup>By effective tax rate is meant the ratio of net property tax paid by the taxpayer to his taxable

assessment. See footnote to Table 5 for the assumptions made in deriving these tax rates.

<sup>9</sup>For a discussion of the progressivity of provincial vis-a-vis municipal taxes, see J. A. Johnson, Incidence of Government Revenues

and Expenditures, Ontario Committee on Taxation, (Toronto: Queen's Printer, 1967), also O. E. Nelson "Progressivity of the Ontario Retail Sales Tax", Canadian Tax Journal, (Sept.-Oct. 1970).



Ontario's Gross Provincial Product (GPP). Between 1960-61 and 1967-68 local revenues grew slightly faster than GPP, increasing from a ratio of 4.2 per cent to 4.6 per cent. Following the Province's reform program, however, the ratio of local revenues to GPP has dropped back to 4.4 per cent in 1970. This decline again reflects the increasing ascendancy of provincial grants over property taxes in financing local government expenditures and the relative decline in local tax revenues. Local revenues were approximately 48 per cent of total provincial-local own-account revenues in 1960-61, but this proportion has been consistently reduced until, in 1969-70, it reached 29 per cent.

The increased level of support to the local sector has been financed by the greater use of the provincial tax system. Table 7 shows that provincial tax revenues have grown from 4.7 per cent of GPP in 1960-61 to 10.6 per cent in 1969-70. In 1970 provincial transfers to the local sector represented approximately 4.5 per cent of GPP, of which more than one per cent or \$352 million is directly attributable to the reform program. This significant shift of the financing burden away from the property tax base and toward alternative revenue sources reflects the Ontario Government's desire to enhance the overall progressivity of the provincial-local tax structure. Over 40 per cent of the Province's revenues are derived from the personal income and general sales taxes, both of which have been shown in separate studies to be progressive as applied in Ontario.<sup>9</sup>

*Inter-Provincial Comparisons.* An interesting comparison of the relative importance of local taxes as a source of revenue for the ten provinces is given in Table 8. Two main developments are shown.

- First, local per capita revenues increased significantly in each of the provinces during the 1960s.
- Second, these local revenues declined as a proportion of total provincial-local revenues in each of the provinces.<sup>10</sup>

Among all provinces, Ontario recorded the second lowest increase in local per capita taxes during the period, and by far the lowest increase among the central and western provinces.<sup>11</sup> Although Ontario had the highest level of local taxes in 1960 and experienced the greatest expenditure pressures associated with industrial and urban expansion, by

Table 4 — Various Measures of Provincial Support of School Board Expenditures, 1967-70

Definition of Provincial Support	Support Based on Revenue Fund Expenditures		Support Based on Total Expenditures	
	1967	1970	1967	1970
	Per Cent		Per Cent	
Legislative Grants	43.9 <sup>1</sup>	50.8 <sup>1</sup>	36.0	43.4
Legislative Grants 52% of Tax Rebates	43.9	56.2	36.0	48.1
Legislative Grants 52% of Tax Rebates Vocational Unit Grants	—	—	42.9	50.7
Legislative Grants 52% of Tax Rebates Vocational Unit Grants Provincial Contribution to Teachers' Superannuation Fund	—	—	46.7 <sup>2</sup>	54.0 <sup>2</sup>
Legislative Grants 52% of Tax Rebates Vocational Unit Grants Provincial Contribution to Teachers' Superannuation Fund OECAC Interest Subsidization	—	—	46.8	54.3

Source: Public Accounts of Ontario, (Toronto: Queen's Printer, 1967, 1970). Unpublished data.  
<sup>1</sup>Standard basis for measuring school board support.  
<sup>2</sup>Except for the fact that grants are for calendar year, data are comparable to those in Table 3.

Table 5 — Annual Average Growth Rates in Effective Net Property Tax Revenues and Rates

	Compound Annual Growth Rate	
	Per Cent	
	1960-67	1967-70
Municipal Tax Rates	4.4	0.9
School Tax Rates	6.6	5.1
Total Tax Rates	5.4	3.0
Net Property Tax Revenues	10.3	7.7

Source: Ontario Department of Municipal Affairs, Summary of Financial Reports of Municipalities and 1971 Municipal Directory, (Toronto: Queen's Printer, various years).

Note: Effective tax rate is the ratio of net property tax paid by the taxpayer to his taxable assessment. In deriving the growth in effective tax rates, a number of simplifying assumptions have been made. First, the increase in tax revenues as a result of natural growth in the assessment base has been excluded. Second, only one tax rate has been assumed for school purposes and one rate for general municipal purposes. In fact, there are two official mill rates, one for commercial and one for residential property. Third, the 1970 property tax rebates have been assumed to benefit all taxpayers, whereas in fact they have accrued only to residential property owners, farmers or needy pensioners. Finally, no account is taken of the mix of residential, farm and commercial properties — all of whose tax bases bear different relationships to tax levies because they are generally assessed at significantly different proportions of market value. Nevertheless, Table 5 indicates the general drift in tax rates over the decade. It should also be noted that increases in the effective tax rates of individual municipalities and school boards will vary widely around these average increases.

<sup>10</sup>The inter-provincial fluctuations in provincial-local revenues are dependent on total provincial expenditures, relative tax bases, tax rates, and substantial federal equalization payments. The per capita own-account provincial-local revenue

shown in the Table tends to be lower for those provinces receiving federal equalization payments than it would have been in the absence of such assistance.

<sup>11</sup>In 1967, New Brunswick abandoned poll and

personal property taxes when the province took over the major functions of local governments: health, welfare, justice and education. As a result, it recorded the smallest increase in local per capita taxes.



**Table 6 – Value of Reform Policies to Local Government, 1968-69 – 1971-72**  
(\$ million)

Reform Policy	Value of Reform Policy			
	68-69	69-70	70-71	71-72
Residential Property Tax Reduction	109.9	123.8	141.5	150.0
Tax Rebates to Needy Pensioners	—	—	14.5	18.0
Tax Rebates to Farmers	—	—	16.0	16.5
Increased Percentage Support of School Board Expenditures <sup>1</sup>	2.7	37.4	114.2	197.3
Increased Road Grants	—	—	14.5	18.2
Amortization Subsidies to Municipalities for Sewerage Projects and Water Pipelines	—	—	0.9	0.9
Increased Support for Reformed Municipal Governments	—	—	2.1	6.8
Reformed Mining Revenue Payments	—	—	—	0.4
Reformed Unconditional Grants	—	—	—	—
Metro Toronto Conservation Authority	—	—	—	1.0
Assumption of Administration of Justice <sup>2</sup>	18.0	19.2	20.3	21.3
Assumption of the Costs of Property Assessment <sup>2</sup>	—	—	20.8	22.1
Removal of Exemption on University Properties	—	—	2.5	2.8
Removal of Exemption on Mineral Processing Facilities	—	—	5.0	5.0
Removal of Exemption on Properties of CAATS	—	—	—	0.9
Removal of Exemption on Provincial Park Properties	—	—	—	0.2
Total Value of Reforms in Reducing Financial Burdens on Local Governments	130.6	180.4	352.3	461.4

<sup>1</sup>The value of reform is only that amount of grant attributable to raising the Province's level of support above the 1967 level of 44 per cent. Calendar year data.

<sup>2</sup>Based on the assumption that municipalities would not have substantially increased expenditures on the administration of justice and assessment had they retained these responsibilities.

1969 its local per capita tax level was among the lowest in the central and western provinces.

### III TARGET GROUPS IN LOCAL TAXATION

The Province's reforms are also aimed at reducing the regressivity of the provincial-local tax system through the introduction of property tax rebates. This section begins with a general description of the property tax structure as it existed in Ontario in the 1960s and then analyzes the differential tax burdens upon various classes of real estate and the changes in their relative positions over time. The contribution of tax rebates to the reduction in relative tax burdens on residential property owners and farmers is also analyzed.

#### The Property Tax Structure

There are really two main property taxes — the tax levied on real property (and, by implication, on the owner) and the business tax (which is levied on businessmen who are occupants of real property). There are also a variety of properties which are assessed but exempt from taxation.

*The Property Tax Base.* Property classes are distinguishable either as a result of being taxed at different mill rates or as a result of being assessed at significantly different proportions of market value. Thus there are two main property classes: the residential property class which is taxed at the low residential mill rate and the non-residential property class which is taxed at the higher

**Table 7 – Provincial and Local Government Revenues in Relation to Gross Provincial Product**  
(\$ million)

	1960-61	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70
Own-Account Local Revenues	648.7	884.5	965.8	1,070.5	1,242.9	1,267.7	1,435.3
Own-Account Provincial Government Revenues	715.1	1,346.4	1,591.2	1,962.8	2,310.0	2,747.0	3,460.1
Total Provincial-Local Revenues	1,363.8	2,230.9	2,557.0	3,033.3	3,552.9	4,014.7	4,895.4
Ratio of Local Revenues to Total Provincial-Local Revenues	47.6%	39.7%	37.8%	35.3%	35.0%	31.6%	29.3%
Ratio of Local Revenues to Gross Provincial Product	4.2%	4.4%	4.3%	4.2%	4.6%	4.3%	4.4%
Ratio of Provincial Government Revenues to Gross Provincial Product	4.7%	6.6%	7.1%	7.7%	8.5%	9.3%	10.6%

Source: Tax Structure Committee, Government Revenues and Expenditures 1960-61 to 1971-72, mimeo. Unpublished data from the Ontario Department of Treasury and Economics.

Note: Own-account revenues are those revenues levied by the government in question.



Table 8 — Inter-Provincial Comparison of Local and Total Provincial Sector Revenues<sup>1</sup>

	1960-61			1969-70			
	Per Capita Property Tax and Other Own-Account Local Revenues	Per Capita Own-Account Provincial- Local Revenues	Local Revenue as a Proportion of Provincial- Local Revenues	Per Capita Property Tax and Other Own-Account Local Revenues	Per Capita Own-Account Provincial- Local Revenues	Local Revenue as a Proportion of Provincial- Local Revenues	Increases in Local Per Capita Taxes over the Period 1960-61 to 1969-70
	Dollars	Dollars	Per Cent	Dollars	Dollars	Per Cent	Per Cent Change
Newfoundland	11	71	15.5	29	264	11.0	164
P.E.I.	26	104	25.0	61	270	22.6	135
Nova Scotia	55	123	44.7	109	367	29.7	98
New Brunswick	52	137	38.0	75	359	20.9	44
Quebec	83	193	43.0	168	510 <sup>2</sup>	32.9 <sup>2</sup>	102
Ontario	106	223	47.5	188	641	29.3	77
Manitoba	85	154	55.2	157	513	30.6	85
Saskatchewan	104	220	47.3	205	560	36.6	97
Alberta	105	248	42.3	202	651	31.0	92
British Columbia	101	251	40.2	192	680	28.2	90

Source: Tax Structure Committee, Government Revenues and Expenditures 1960-61 to 1971-72, mimeo.

<sup>1</sup>Provincial property and business assessment taxes included in local revenues where applicable.

<sup>2</sup>Assuming a Quebec basic abatement for personal income taxation of 28% rather than 50%.

commercial mill rate. The former class has three constituent sub-classes: homes, apartments and farms. The latter class also has three constituent sub-classes: industrial (manufacturing), commercial, and "special". "Special" properties comprise certain transportation and communication properties which are partially assessed according to statutory rates and constraints. The other five sub-classes are generally assessed, on average, at significantly different proportions of market value within a municipality. Moreover, identical sub-classes have been generally assessed at differing proportions of market value among municipalities.

*The Business Tax Base.* In addition to the general property tax, the occupant of a commercial or industrial property is further assessed for purposes of business taxation at some proportion of the property's normal taxable assessment. The proportion varies from 140 per cent for distillers to 25 per cent for car park operators.<sup>12</sup>

*Tax Rates.* The residential mill rate in Metropolitan Toronto and the regional municipalities is statutorily set at 15 per cent less than that applicable to commercial and industrial properties. In other parts of the province the

residential and farm mill rates are reduced by the value of the municipal unconditional grant. In all areas farm and residential mill rates for school purposes are set at a level 10 per cent below the commercial mill rate. The resulting difference between commercial and residential mill rates is called the split mill rate.

*Exemption from Property Tax Liability.* Local fiscal capacity is reduced to the extent that a significant number of properties are granted exemption from the liability to make payment of taxes and are not liable to compensating payments-in-lieu of taxes. Such properties can be classified according to title of ownership as federal, provincial, local, or private. In the past, it has been general assessment practice to ignore or at best provide only a token assessed value for these properties. Thus, an accurate estimate of the extent of the loss to the local tax base from this source is precluded until province-wide reassessment has been completed.

*Payments-in-Lieu of Property Taxes.* The potential revenue loss is to some extent offset as a result of the payment of grants-in-lieu of prescribed local taxes by the federal and provincial governments upon crown and

crown agency properties. Payments-in-lieu taxes by the Ontario Government and Ontario Hydro in 1969 amounted to roughly \$20 million.

#### Relative Tax Burdens on Property Classes, 1960-69

The impacts upon relative tax burdens of varying assessed value/market value ratios, business taxation and split mill rates are shown in the Appendix, Table C. The assessment/market value ratios for the municipalities included in the sample indicate that homes and farms have traditionally been assessed at a lower proportion of market value than commercial, industrial and apartment properties, the latter two classes of property having been assessed at approximately two-and-one-half times the rate upon farms and more than half as much again as the rate upon homeowners. When combined with the imposition of a business tax and a split mill rate, the tax burden upon commercial and industrial properties is significantly greater than the respective burdens upon homeowners and farmers. Indeed, the relative burden upon industrial properties would appear to have been four times that faced by a farmer.

<sup>12</sup>150 per cent and 10 per cent respectively prior to the 1968/69 Assessment Act.



### Change in Relative Tax Burdens, 1960-69

The average assessment/market value ratios for each of the main property classes for 1969 and the relative tax burdens are shown in the Appendix, Table D. This shows that the ranking of property classes according to assessment/market value ratios remains virtually unchanged when compared with the earlier period, with the exception that apartment properties are now assessed at a rate slightly below that attributed to commercial properties. On the other hand, all classes now appear on the average to be assessed at a significantly lower proportion of market value, with the ratios for the residential and apartment classes showing the greatest declines.

A summary comparison of the relative tax burdens upon the various property classes for the period 1960-63 and the year 1969 is provided in Table 9.<sup>13</sup> Even apart from the impact of the basic shelter exemption introduced in 1968, it can be concluded that the relative tax burdens upon homeowners, apartment owners and farmers have been reduced relative to commercial/industrial properties over the nine-year period as a result of greater than proportionate reductions in their ratios of assessments to market values. When the impacts of the residential property tax relief and farm tax reduction programs are included, the shift of the relative property tax burden away from residences and farms is even more dramatic. The relative burdens upon homeowners and farmers are less than one-third and one-sixth, respectively, of the burden upon industrial property.

The program of selective property tax relief for needy pensioners, as introduced in

1970, reduces the burden upon these taxpayers by a further amount.

### IV FUTURE DIRECTIONS

There are three main thrusts to the future development of the Province's reform in provincial-local finance: increasing provincial support of local governments, consolidation and simplification of the grant system, and the securing of a more progressive provincial-local tax system.

#### Increasing Provincial Support

The Government has already announced its commitment to increase its level of support of school board expenditures to 60 per cent. However, the costs of moving to 60 per cent and beyond are enormous. To have reached 75 per cent support in 1970, for example, would have required an additional \$425 million of provincial funds. To finance this amount would have required an additional 5 points on the personal income tax plus an increase in retail sales tax from 5 to 7 per cent.<sup>14</sup> These facts indicate clearly the extent to which the Province's ability to finance a greater share of local expenditures will be constrained if it is to hold the line on tax rates and fails to secure increased personal or corporate income tax abatements from the federal government. Sixty per cent support is a reasonable objective for the immediate future but it may be too low in the longer run. The Province will certainly consider the possibility of providing even greater support when finances become available.

The Province is also continuing to remove property tax exemptions as a means of increasing its financial support to municipal

governments. In 1970 it introduced compensating grants of \$25 per student to universities to enable them to begin to pay local taxes. As a further development of this policy municipalities will be allowed, in 1971, to tax properties of community colleges and provincial park land.

#### Consolidation and Simplification of the Grant System

Except in the case of those services where there is a strong provincial involvement and where provincial priorities must be maintained, the Province intends to reduce the number of conditional grants. The purpose of this policy is to enable municipalities to spend on the basis of their own priorities and to ensure that they have sufficient fiscal capacity to do so. In this context the present collection of conditional grants (listed in the Appendix, Table B) will be carefully reviewed to eliminate as many as possible and replace them with increased unconditional transfers to local government.

This reduction in the number of conditional grants will simplify the provincial-local grant system for local administrators. It will also generate significant savings as salaries and overhead costs related to the administration of grants are eliminated. Further, the Province will also continue the process of simplifying individual grants — as it has done this year with library grants. In addition to these measures, the Province is implementing a common reporting system for provincial, local government and local enterprise expenditures to enhance public understanding of the provincial-municipal segment of the government sector.

#### Towards a Progressive Local Tax Structure

The development of Ontario's property tax rebate system, together with the complementary rebates to farmers and pensioners, has increased the progressivity of property taxation in two main ways. First, along with increased municipal and education grants, the rebates have worked to control the absolute level of property taxation. Second, the rebates have improved the progressivity of property taxation by more closely relating net property taxes to ability-to-pay.<sup>15</sup>

As a further stage, however, Ontario's tax reform policy involves relating property tax burdens directly to ability-to-pay through selective credits in the personal income tax system. The Ontario Government's proposals

**Table 9 — Indices of Relative Tax Burdens**

Property Class	1960-63	1969		
		Assuming No Reforms	After Residential Property Tax Reduction Program	After Farm Tax Reduction Program <sup>1</sup>
Commercial	75	81	81	81
Industrial	100	100	100	100
Residential	41	32	27	27
Apartment	66	51	44	44
Farm	26	23	19	14

Source: See Appendix, Tables C and D.

<sup>1</sup> Assuming the Farm Tax Reduction Program had been implemented in 1969.

<sup>13</sup> For derivation see Appendix, Tables C and D.

<sup>14</sup> To the extent that school property taxes on corporations are reduced, and corporate taxable income consequently increases, corporate

income tax revenues will rise. However, the largest part of this revenue gain will accrue to the federal government. Nevertheless, it is estimated that the Province would have gained

roughly \$25 million in corporation taxes by moving to a 75 per cent support position in 1970. This assumes that the increased support level results in lower school property taxes



for the use of personal income tax credits in controlling the incidence of property tax burdens were advanced as an integral part of the 1969 white paper on provincial-municipal tax reform. Under the present federal-provincial collection agreement, whereby the provincial income tax is collected by the federal government, the Province does not

have the right to implement selective personal income tax credits. In its 1969 white paper on tax reform the federal government admitted the possibility of allowing Ontario to introduce income tax credits to offset the burden of other provincial and municipal taxes.<sup>16</sup> In response to the federal white paper, the Ontario Government has devel-

oped a series of proposals as part of the discussion of national tax reform.<sup>17</sup> These proposals enumerate in detail the types of tax credits envisaged by the Ontario Government, both to make the income tax system itself more equitable and to integrate the main forms of federal, provincial and municipal taxes.

Appendix

Table A – Selected Statistics on Financing Local Government (\$ million)

	1960-61	1967-68	1970-71 <sup>1</sup>
<b>School Boards</b>			
Grants	176.7	617.7	1,038.2
Net Tax Revenues	260.3	555.8	738.0
Other Revenues	11.5	26.0	53.2
Borrowing <sup>2</sup>	73.5	78.7	120.6
Expenditures	522.0	1,278.2	1,950.0
<b>Municipalities</b>			
Grants	152.4	337.3	545.1
Net Tax Revenues	310.3	575.2	675.9
Other Revenues	88.1	167.2	215.0
Borrowing <sup>2</sup>	73.8	43.0	94.0
Expenditures	624.6	1,122.7	1,530.0

Source: Ontario Department of Education, Report of the Minister of Education, Ontario, (Toronto: Queen's Printer, 1960-69).  
Ontario Department of Municipal Affairs, Summary of Financial Reports of Municipalities, (Toronto: Queen's Printer, 1960-69).  
Dominion Bureau of Statistics, Local Government Finance, cat. no. 68-204, (Ottawa: Queen's Printer, 1960-67).  
Public Accounts of Ontario, (Toronto: Queen's Printer, 1961-70).  
Unpublished data from Department of Education and the Department of Municipal Affairs.

<sup>1</sup>Estimated.  
<sup>2</sup>New borrowing less repayments.

Notes: Grants data are for fiscal years ending March 31 whereas net tax revenues, borrowing and expenditures are estimated for calendar years.  
Included in other revenues of school boards are the differences between calendar year and fiscal year grants. For example, school board grants for 1970 were \$10.7 million greater than school board grants for 1970-71 and this amount is included in other revenues. Such adjustments are necessary to balance calendar year data on expenditures with net tax revenues and borrowing.  
Ontario Government tax rebates are allocated to school boards and municipalities in proportion to their gross tax levies.

rather than increased school board expenditures.  
<sup>15</sup>For a discussion of how property taxes have been related to income (i.e. ability-to-pay) in Ontario, see J. A. Johnson, The Incidence of

Government Revenues and Expenditures, op. cit.  
<sup>16</sup>Hon. E. J. Benson, Proposals for Tax Reform, (Ottawa: Queen's Printer, 1969), Chapter 7.

<sup>17</sup>Hon. C. S. MacNaughton, Ontario Proposals for Tax Reform in Canada, op. cit., and Staff Paper, Effects of Ontario's Personal Income Tax Proposals, op. cit.



**Table B – Provincial-Local Conditional Grants, 1970-71**  
(\$ Thousands)

	Value of Grant to All Municipalities 1970-71 <sup>1</sup>
<b>Agriculture</b>	
Warble Fly Control Act	44
Weed Control Act	72
Community Centres Act	1,600
ARDA, Drainage	500 <sup>2</sup>
<b>Education</b>	
Legislative Grants:	
Ordinary grants including CPP	832,304
Extraordinary grants	
Education mill rate subsidy	
Cost of education of retarded children	
Isolate boards	
Boards on tax-exempt land	52,000
Constructing and Equipping Vocational Units	
Employer Contribution to Teachers' Superannuation Fund	
Library Grants	7,670
Department of Education Act:	
Arena program managers	30
Community programs of recreation	1,350
<b>Energy and Resources Management</b>	
Conservation Authorities Act:	
Acquisition and development of land	11,271
Flood control projects	
Flood control engineering study	
Recreational development in conservation areas	
Reservoirs	
Administration grant	200
Parks Assistance Act	
<b>Health</b>	
The Public Health Act:	
Oral diabetic insulin	94
Diagnostic laboratory grants	63
Health units	19,300 <sup>3</sup>
Boards of health	
Venereal Disease Prevention Act	13
<b>Highways</b>	
Highway Improvement Act:	
Road construction and maintenance	172,280
Bridges and culverts	
Connecting links	12,970
Sidewalks on King's Highways	80
Development roads	22,975
Grants to local road boards and statute labour boards	
in unorganized territory	2,350
Traffic and planning studies	1,345



**Table B – Provincial-Local Conditional Grants, 1970-71 (Continued)**  
(\$ Thousands)

	Value of Grant to All Municipalities 1970-71 <sup>1</sup>
<b>Justice</b>	
Registry Act:	
Clarification of boundaries	20
Emergency Measures Act	910
<b>Lands and Forests</b>	
Forestry Act	215
Wolf and Bear Bounty Act	70
<b>Municipal Affairs</b>	
Planning Act:	
Urban renewal	5,000
Survey, design, supervision and maintenance	135
Drainage Act	3,500
Municipal Unconditional Grants Act:	
Indigent hospitalization	2,689
<b>Public Works</b>	
Aid Remedial Works	25
Municipal Drainage	4
<b>Social and Family Services</b>	
General Welfare Assistance Act:	
General assistance	86,984
food and clothing	
shelter	
fuel	
special diets	
pre-added budgets	
nursing homes	
hostels	
foster children	
utilities	
household supplies	
Special assistance	2,200
Supplementary aid	
Administration costs	2,200
District Welfare Administration Boards Act <sup>4</sup>	—
Child Welfare Act:	
Children's aid societies	36,981
operating costs	
capital grants	
children of unmarried mothers	
children from unorganized territory	
child welfare — extra assistance	
Day Nurseries Act	2,775
Homemakers and Nurses Services Act	1,390



**Table B – Provincial-Local Conditional Grants, 1970-71 (Continued)**  
(\$ Thousands)

	Value of Grant to All Municipalities 1970-71 <sup>1</sup>
<b>Social and Family Services (Continued)</b>	
Homes for the Aged Act:	
Maintenance of homes for the aged	20,000
Acquisition or alteration	
Capital grants	
Private-home care	
Residents from unorganized territory	
Elderly Persons Centres Act	125
Miscellaneous Grants	20
<b>Tourism and Information</b>	
Establishment and Maintenance of Museums	96
<b>Trade and Development</b>	
Elderly Persons Housing Aid Act	350
<b>Total</b>	1,365,839

Source: Ontario Department of Municipal Affairs, Provincial Assistance to Municipalities, Boards and Commissions, mimeo (Toronto: Queen's Printer, 1970); also preliminary estimates of departments.

<sup>1</sup>Includes federal share of grants; all amounts are either preliminary or estimated.

<sup>2</sup>Includes some drainage grants financed entirely by Ontario and some shared by the federal government.

<sup>3</sup>Excludes \$250 thousand in grants for community health facilities.

<sup>4</sup>Included in administration.

**Table C – The Local Tax Structure, 1960-63**

Property Class	Assess- ment as Per Cent of Market Value	Average Business Assess- ment <sup>1</sup>	Average Mill Rates (1962)			Implied Average Equalized Mill Rates			Index of Relative Tax Burdens <sup>2</sup>
	Median	Per Cent	Municipal	School	Total	Municipal	School	Total	(Industrial = 100)
Commercial	36	45	38	31	69	13.7	11.1	24.8	75 <sup>2</sup>
Industrial	48	45	38	31	69	18.2	14.9	33.1	100 <sup>2</sup>
Residential	32	NIL	34	28	62	10.9	8.9	19.8	41
Apartment	51	NIL	34	28	62	17.3	14.3	31.6	66
Farm	20	NIL	34	28	62	8.7	7.1	12.4	26

Source: Report of Ontario Committee on Taxation, Vol. II, op. cit.

<sup>1</sup>Assumed average rate for all types of businesses.

<sup>2</sup>Relative tax burdens include the burden of the business tax.



Table D – The Local Tax Structure, 1969

Property Class	Assessment as Per Cent of Market Value	Average Business Assessment <sup>1</sup>	Average Mill Rates (1969)			Implied Average Equalized Mill Rates			Index of Relative Tax Burdens <sup>2</sup>		
									(A)	(B)	(C)
									Assuming No Reforms	Following Residential Property Tax Reduction	Following Farm Tax Reduction Program <sup>3</sup>
	Median	Per Cent	Municipal	School	Total	Municipal	School	Total	(Industrial = 100)		
Commercial	35	38	44	48	92	15.5	16.7	32.2	81	81	81
Industrial	43	38	44	48	92	19.0	20.6	39.6	100	100	100
Residential	21	NIL	39	43	82	8.2	9.0	17.2	32	27	27
Apartment	34	NIL	39	43	82	13.4	14.5	27.9	51	44	44
Farm	15	NIL	39	43	82	5.9	6.4	12.3	23	19	14

Source: Department of Municipal Affairs, equalization data. Department of Municipal Affairs, Summary of Financial Reports of Municipalities 1969, (Toronto: Queen's Printer, 1970).

<sup>1</sup>Assumed average for all types of business.

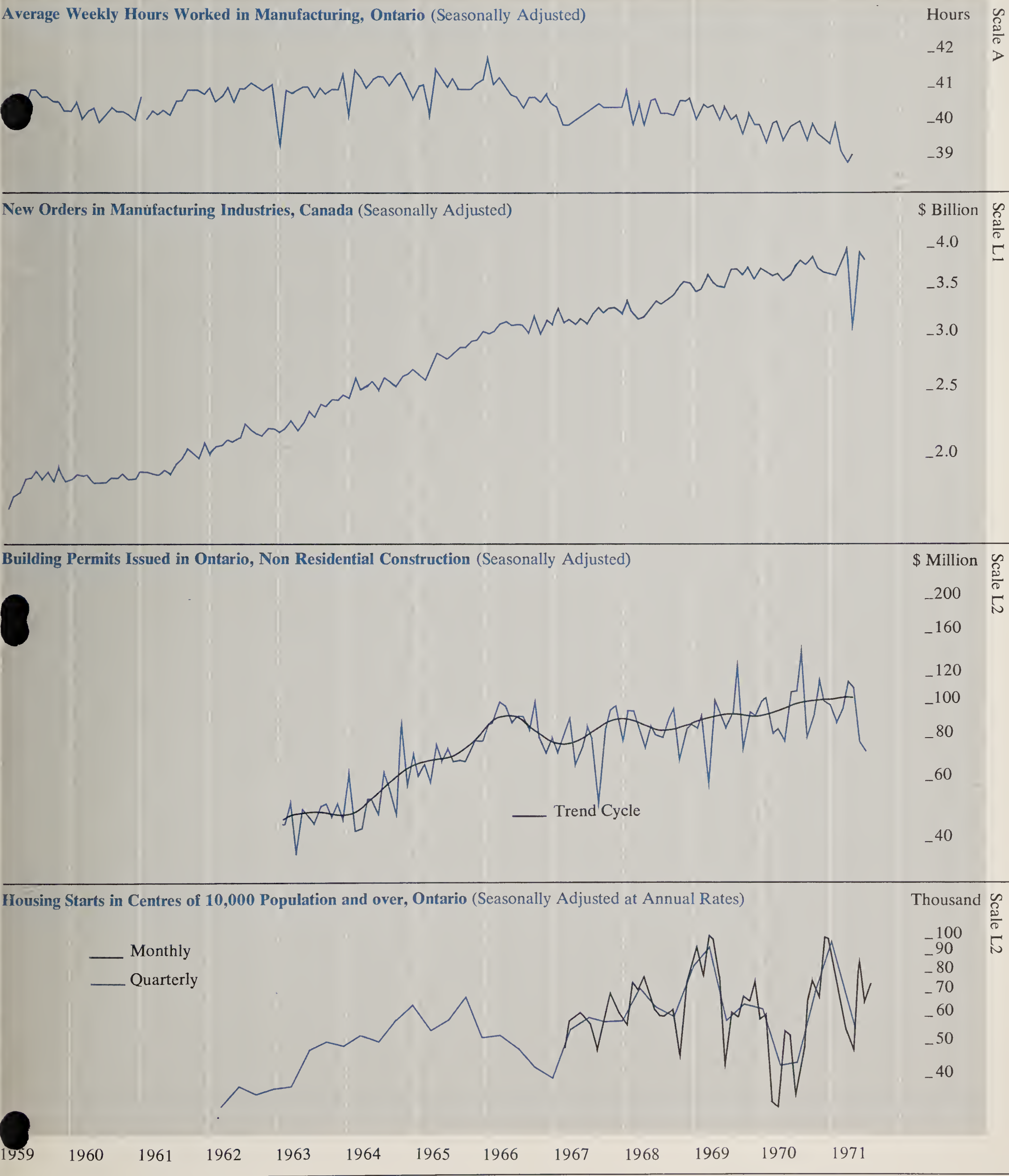
<sup>2</sup>Relative tax burdens on "Commercial" and "Industrial" include the burden of the business tax.

<sup>3</sup>Assuming the farm tax reduction program had been implemented in 1969 rather than 1970.



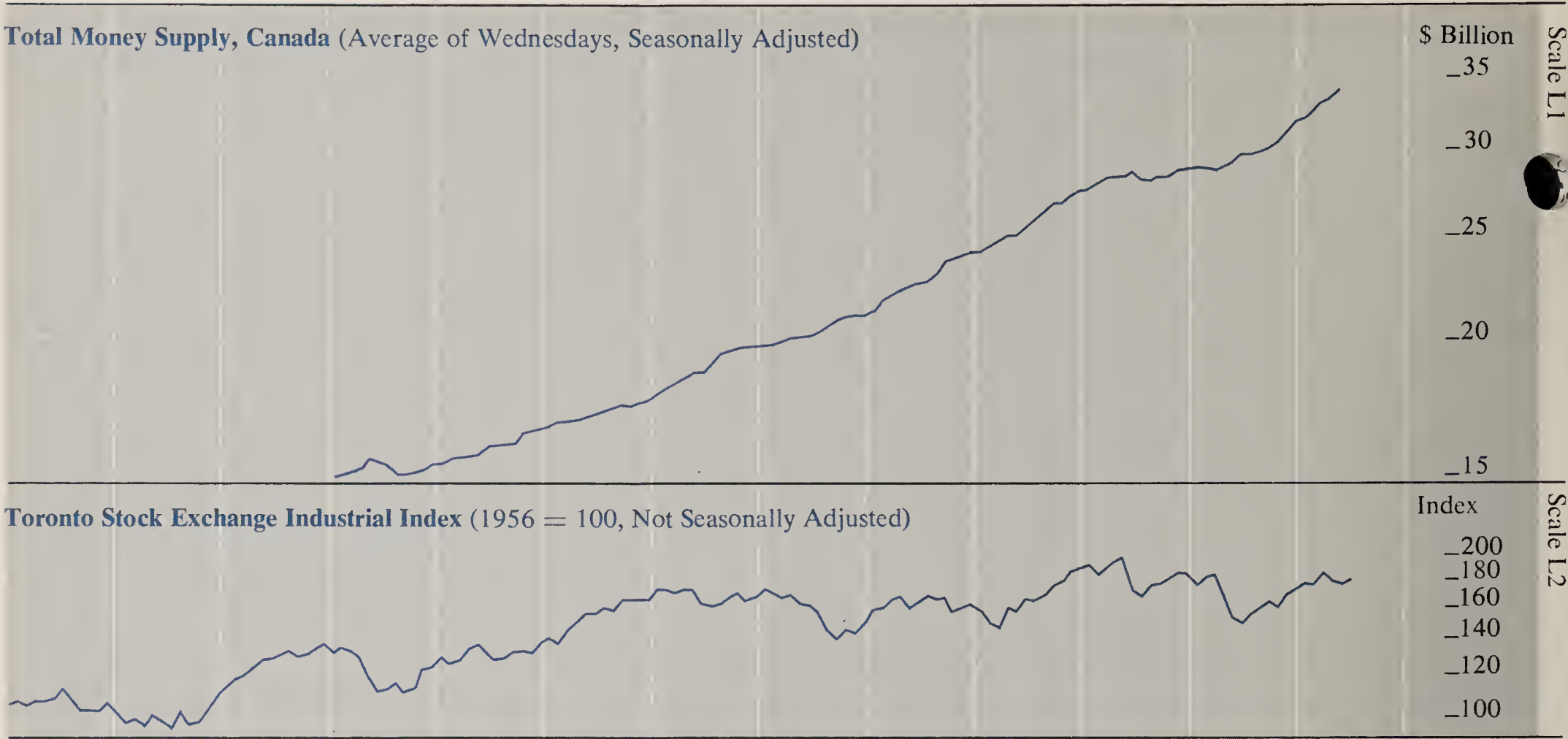
# Selected Economic Indicators

## Leading Indicators

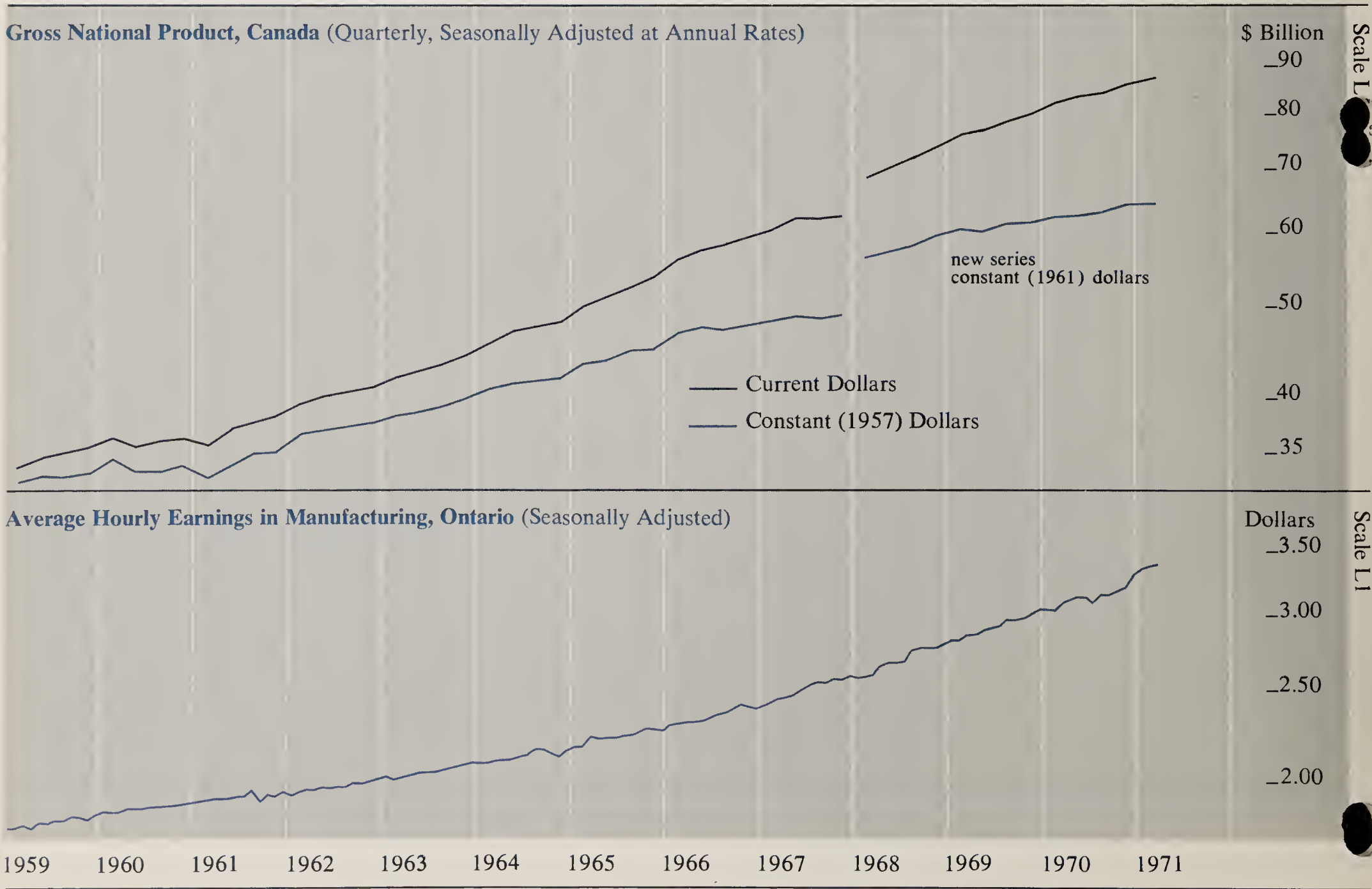




# Leading Indicators



# Coincidental and Lagging Indicators





# Coincidental and Lagging Indicators

**Average Yield of 3-Month Treasury Bills, Canada** (Last Wednesday of the Month, Not Seasonally Adjusted)

Per Cent

Scale A

8.0  
7.0  
6.0  
5.0  
4.0  
3.0  
2.0



**Employment, Ontario** (Seasonally Adjusted)

Million

Scale L1

3.25  
3.00  
2.75  
2.50  
2.25



**Unemployment Rate, Ontario** (Per Cent of Labour Force, Inverted Scale, Seasonally Adjusted)

Per Cent

Scale A

2.0  
3.0  
4.0  
5.0  
6.0



**Index of Motor Vehicle Production, Canada** (1961 = 100, Seasonally Adjusted)

Index

Scale L2

400  
300  
200  
100  
70  
50



1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971



	1970												1971											
	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June										
Leading Indicators																								
Average Weekly Hours Worked in Manufacturing																								
New Orders in Manufacturing Industries <sup>c</sup>																								
Building Permits Issued in Ontario, Non-Residential Construction																								
Urban Housing Starts (Annual Rate)																								
Money Supply <sup>c</sup>																								
T.S.E. Industrial Index <sup>u</sup>																								
Business Failures <sup>u</sup>																								
Business Failures — Liabilities <sup>u</sup>																								
Coincidental and Lagging Indicators																								
Gross National Product <sup>c</sup> (Annual Rate)																								
Average Hourly Earnings in Manufacturing																								
3-Month Treasury Bill Rate <sup>c,u</sup>																								
Cheques Cashed in Clearing Centres <sup>1</sup>																								
Retail Trade																								
Labour Force																								
Employed																								
Unemployed																								
Unemployed as % of Labour Force																								
Wages and Salaries																								
Index of Industrial Employment																								
Index of Industrial Production <sup>c</sup>																								
Total Manufacturing <sup>c</sup>																								
Non-Durables <sup>c</sup>																								
Durables <sup>c</sup>																								
Mining <sup>c</sup>																								
Electric Power and Gas Utilities <sup>c</sup>																								
Primary Energy Demand (Annual Rate)																								
Exports (including re-exports) <sup>c</sup>																								
Imports <sup>c</sup>																								
Unclassified Indicators																								
Foreign Exchange Reserves <sup>c,u</sup>																								
Industrial Materials Price Index <sup>c,u</sup>																								
Consumer Price Index <sup>c,u</sup>																								

<sup>c</sup>Statistics for Canada.  
<sup>u</sup>Not seasonally adjusted.  
<sup>1</sup>Ontario less Toronto.









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# Ontario Economic Review

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September/October 1971  
Volume 9, Number 5

Department of Treasury and Economics

Hon. W. Darcy McKeough, Treasurer of Ontario  
and Minister of Economics

H. Ian Macdonald, Deputy Minister

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# Ontario Economic Review

September/October 1971

Volume 9, Number 5

## The Ontario Economy

1

## Ontario Economic Accounts: A Dual Approach to

4

Patricia S. Fromstein, *Economist*  
Department of Treasury and Economics

## the Measurement of Provincial Product

## Selected Economic Indicators

14

A publication of the  
Department of Treasury  
and Economics  
Government of Ontario

Hon. W. Darcy McKeough  
*Treasurer of Ontario and  
Minister of Economics*

H. Ian Macdonald  
*Deputy Minister*

The *Ontario Economic Review* is prepared and edited bimonthly in the Economic Analysis Branch of the Economic and Statistical Services Division, Department of Treasury and Economics. The review presents articles of interest as well as current information on economic activity in Ontario. Signed articles reflect the opinions of their authors and do not necessarily represent the views of the Department.

Subscriptions can be obtained free of charge by writing the Editor, *Ontario Economic Review*, Department of Treasury and Economics, Frost Building, Queen's Park, Toronto 182, Ontario.

### About the Review

The feature article for the September/October edition of the *Ontario Economic Review* presents a detailed description of the methodological problems that arise in the development of a conceptual framework for the presentation of national account type data at the sub-national level. To provide a comprehensive picture of the provincial economy two complementary approaches have been adopted for the Ontario Economic Accounts. This paper describes a system of provincial economic accounts based on the "domestic" concept and compares it with the "national" set published in the November/December 1970 issue of this review.

The first section of this study outlines the conceptual framework underlying the "domestic" accounts, while the second part describes the estimation procedures employed. The last section discusses the sectoral accounts and their structural relationships in comparison with the set of accounts based on the "national" concept. The appendix contains annual estimates of the major components of Ontario income and expenditure for the years 1947 to 1969. Development of the "domestic" accounts now allows research workers to select the aggregate measure most appropriate to their particular analytical needs.

This article was prepared by Patricia S. Fromstein, Chief of the Provincial and Regional Accounts Section, Economic Analysis Branch, Department of Treasury and Economics.

### Indicator Charts, Pages 14-16

Fluctuations in aggregate economic activity — commonly used to define business cycles — do not necessarily correspond with fluctuations in the individual activities which make up the aggregate. Instead different indicators of economic activity may vary with respect to both their rates of growth and the timing of their peaks and troughs: some may grow more rapidly than others, some change direction sooner.

Those activities which tend to assume a direction in advance of the aggregate — because they relate to future rather than present production — are referred to as leading indicators, and are widely used to anticipate the short-run future course of the overall economy. The charts on pages 14-16 in the *Ontario Economic Review* present a number of these leading indicators, as well as several which are coincidental to or lag behind the aggregate, to provide for the reader an opportunity to make such an evaluation.

While comparisons of the timing and direction of general changes in the various indicators can readily be made, great care must be exercised in making such a comparison of the amplitude of fluctuations. Of the three vertical scales used — 'A' (arithmetic) and 'L 1' and 'L 2' (logarithmic scales with one and two cycles respectively over a given vertical distance) — only the logarithmic scales can be used to compare relative changes in different indicators. *And this applies only when all series being compared are on the same logarithmic scale.* In such a situation all parallel lines represent equal rates of growth, the exact rate of growth being determined by the slope of the line.



## SURTAX CONTINGENCY PLAN REVEALED

In order to support Employment in Canada by mitigating the disruptive effect on Canadian industry of the imposition of United States import surtaxes, federal Industry, Trade and Commerce Minister Jean-Luc Pepin has proposed to Parliament an allocation of \$80 million to counter the recent U.S. actions. A board to administer the fund is to be appointed under the special bill with an additional \$300,000 allocated to pay the administrative costs.

The \$80 million program would be available to firms that exported at least 20 per cent of their 1970 production to the United States. The proposal is designed to save industrial jobs with subsidies that would offset up to two-thirds of the ten per cent U.S. import surcharge.

Federal Finance Minister E. J. Benson told the commons that the subsidy plan was a first step to offset the immediate problem caused by the surcharge but declined to outline the other measures under study.

The federal government's first long-term analysis of the effects of the surcharge indicate that if it is in effect for three months, the direct loss of export sales at annual rates could well approach \$400 million; if for six months, the loss could be \$700 million; and if for one year, possibly \$900 million. The resulting loss of jobs might approximate 40,000, 70,000 and 90,000 respectively. These projections are based on an examination of 1,300 firms and further predict that about 150 companies would face financial ruin within a year and that between 15 and 20 other firms would move to the United States.

The legislation emphasizes that the grants are to be used to maintain as near full employment as possible, rather than to cover sales losses that firms might incur because the surcharge raised the price of their goods in the United States.

The bill, entitled the Employment Support Act, outlines how the \$80 million will be administered and the criteria under which allocations will be made. Within the general guidelines set out by Mr. Pepin companies applying for assistance will have to meet the following three criteria:

- Proof must be given that the U.S. surcharge has caused or is likely to cause significant layoffs at the plant;
- It must be shown that at least 20 per cent of the plant's production during 1970 con-

sisted of imports now subject to the surcharge;

- Evidence must be given that the company is attempting to maintain production and employment at the plant "at a satisfactory level".

The legislation creates an Employment Support Board with a budget of \$300,000 to administer the fund. The board's seven members are to be named by the Cabinet. Under the bill, three of these members, including the board's chairman, must be from outside the government. The act does not set a maximum amount for individual grants, but makes it clear that the board must be satisfied the size of the grant is not in excess of what the applicant needs to maintain a satisfactory employment level.

As a safeguard, the board is also authorized to define assistance periods for each individual applicant. These periods will be the board's evaluation of the time a specific grant should cover. Although industries will be assured or refused a grant at the time of application, the actual grant will be made only at the end of the assistance period. Mr. Pepin also stated that generally speaking, government policy would limit the size of grants to two-thirds of the amount of the surtax as it affects individual plants. Moreover, grants would be calculated on a three-month period retroactive to August 16th, the date following President Nixon's announcement of the surtax.

The specific \$80 million program is set to expire at the end of the current fiscal year, March 31, 1972, although it is to be extended if the surcharge is still in effect. While the legislation would be put aside when the surtax ended it provides for enabling legislation that might be used again under similar circumstances. Thus the act does not refer directly to the United States but to the "imposition of foreign import surtaxes".

Commenting on Ottawa's proposed Employment Support Act, Ontario Premier William Davis said his government welcomed the bill and appealed to everyone concerned to support the federal government measure to ensure that it is "administered with a minimum of delay and red tape".

Premier Davis said that the act looks sound and workable at first glance, but added that he is preparing to take independent action if the federal measure proves to be inadequate. "It seems possible that some companies that need and deserve assistance may not be able to qualify for it under the

federal legislation, flexible though it is." The Premier went on to state that his government is prepared to provide assistance — "perhaps in the form of low interest loans — for Ontario companies that are harmed by the surcharge but not eligible for federal help".

Following the announcement of the federal government's measure aimed at counteracting the impact of the U.S. ten per cent import surcharge it was learned that the U.S. government was considering imposing countervailing duties to nullify the effect of the \$80 million Employment Support Act.

Canadian firms that are assisted by the federal government's legislative action to provide subsidies to enable the companies to make sales in the U.S. could be charged with "dumping" in the American market. It would be within the power of the U.S. administration to impose additional duties against the products of the subsidy-assisted Canadian firms. This would nullify the effects of the special legislation. The federal government, however, insists that its program should not be construed as a retaliatory measure against the American surcharge and maintains that its only aim is to ensure a satisfactory level of employment in Canada. Nevertheless U.S. authorities are studying the Canadian Bill to see whether it would undercut the U.S. program to restrain imports.

When asked if the U.S. government would take action against Canada if it determined the legislation was subsidizing firms to permit cheap imports into the U.S. the Under-Secretary of the Treasury for Monetary Affairs indicated that the U.S. administration would have no alternative but to take action.

At the subsequent annual joint meeting of the International Monetary Fund and the World Bank, United States Secretary of the Treasury John Connally announced that the U.S. was willing to remove the ten per cent import surcharge within a matter of weeks in return for tangible progress toward the dismantling of specific trade barriers and an honest floating of exchange rates.

In a definite softening of the formerly rigid U.S. position, Mr. Connally said free market forces should be utilized in the process of determining new levels for the world's major currencies. He indicated that if other governments would confirm their willingness to remove artificial impediments to freely floating rates and would go some way toward removing trade barriers within the coming



weeks, the United States would be prepared to cancel the ten per cent import surcharge.

While Mr. Connally did not specifically itemize the trade matters on which immediate progress is sought over the coming weeks, it is likely that the U.S. government has assembled "bills of particulars" for each of its major trading partners. These specific barriers will probably be made known in the private government-to-government negotiations expected to get underway very shortly.

In the bilateral discussions with Canada the U.S. will almost certainly call for an end to the present Canada-U.S. Automotive Agreement signed in 1965. At the time the new U.S. economic measures were brought down the two governments were in the midst of discussions for the purpose of improving the auto agreement from the point of view of both countries. Following President Nixon's announcements on August 15, the talks were broken off. The Canadian federal government has indicated its interest in resuming discussions but has stated that the auto pact is not negotiable as part of the conditions for removal of the surcharge.

The auto pact was designed to achieve a greater Canadian input into automotive production and create one North American market for automotive products. In complying with the commitments to step up Canadian production, U.S. car makers chose to produce in Canada a large share of their total North American output of compact models. Compacts have subsequently become the fastest selling models in both the U.S. and Canada and the result has been an unexpected increase in car exports from Canada to the United States. Moreover, in contrast to projections of more rapid increases in Canadian than American demand in the latter 1960's, automotive sales have grown faster in the U.S. than in Canada in recent years. Thus shifts in both production and sales have occurred, with the result that U.S. imports from Canada have grown far more rapidly than expected at the time of the agreement. Consequently the U.S. claims that the transitional period of the auto agreement has expired and that there has been over-achievement of Canadian value-added in terms of the original agreement.

The United States ran a balance of trade surplus with Canada until 1967, but the balance then turned toward progressively larger deficits. About one-third of the present deficit (approaching a seasonally-adjusted rate of \$700 million in the first seven months

of 1971) is accounted for by increasing Canadian sales of automobiles and parts. The U.S. is extremely anxious to make removal of the import surcharge conditional on removal of the transitional safeguards in the 1965 auto pact since the huge trade in autos and parts is a separate agreement and therefore exempt from the recent surcharge. In fact, without renegotiation of the auto pact the overall decline in manufactured export sales to the U.S. will probably be offset by a significant improvement in Canadian exports of autos and parts since Canadian production should benefit from the removal of the seven per cent U.S. excise tax and the imposition of the U.S. import surcharge on non-North American produced cars. Looking ahead to 1972 on the assumption that total U.S. demand will be stronger than in 1971 as a result of the new economic policies, it is reasonable to assume that exports of all non-affected products from Canada to the U.S. will rise significantly. This would result in an even greater imbalance in the trade in motor vehicles and parts between Canada and the U.S. and from the United States point of view accentuates the desirability of renegotiating the auto agreement.

The ten per cent "temporary" surcharge on dutiable imports will affect approximately \$2.5 billion of Canada's present exports to the U.S. markets. This represents less than one quarter of our present exports to that country since the U.S. program exempts unprocessed raw materials, goods which enter under quotas such as Canadian oil and all processed or manufactured exports which are duty-free. This includes the trade in autos and parts, farm machinery and fertilizers, all of which have, since the end of the war, come under various types of free trade agreements with the U.S. The main burden of the surcharge will fall upon \$1.5 billion of Canada's exports of highly manufactured goods — products which already have been seriously affected by the appreciated Canadian dollar. This group includes industrial machinery, electrical products, textiles and clothing, chemicals, furniture and appliances and numerous consumer and industrial products. Ontario, with its heavy concentration of manufacturing, machinery and metal products industries will likely be most affected by the U.S. import duty. Manufacturers sending their products into the U.S. markets have already been handicapped by a six per cent appreciation of the Canadian dollar since June of 1970. The addition of a ten

per cent surcharge and the ten per cent investment tax credit (granted only for the purchase of U.S. made capital goods) will deal a double blow to our growing machinery exports.

### DESIGN FOR DECISION-MAKING

The eighth annual review of the Economic Council of Canada strongly urges all participants involved in government decision-making to adopt a courageous and futuristic attitude toward improving this increasingly important function. The processes by which this objective can be achieved forms the central theme of the review.

The expanded role of government decision-making can be seen in the light of government expenditure. Total government expenditure is following a marked upward trend — it rose from 31.5 per cent of GNP in 1961 to 35.5 per cent in 1970 — while at the same time there have been considerable changes in its composition and distribution. Government expenditure has progressively outgrown its traditional function of financing its regulatory departments and is now heavily involved in economic, financial and commercial activities. It is with particular respect to these activities that the Council stresses the essential need for improved decision-making at all levels of government.

### New Approaches

The Council confirms that to date there is little reliable information on where society is or where it has been and that this is a highly unsatisfactory state of affairs if planning for the future is to be carried out under similar circumstances. While economic statistics are valuable in monitoring the material well-being of the country, they are imperfect indicators for assessing social well-being.

What is required are social statistics or indicators which, within defined limits, can provide some measure of human welfare. However, as the review points out there has been no major development of this kind in Canada. This is the challenge which the Council puts out to the analyst — the creation of a meaningful index of social welfare.

Ideally this index would reflect contemporary needs and could be used as a basis for a more realistic view of the future, thereby allowing preventative measures to be made now rather than having to pay the heavy cost of ill-judged decisions at a future date. In this way, the Council is urging analysts to chart possible futures, so that



the decision-maker can decide on a more systematic framework of national goals.

In examining the systems analysis approach which looks at the decision-making process as a whole and also in terms of the interrelationships of its parts, the Council finds that this type of analysis is too limited. The real world of decision-making is far too complex to fit within a systems framework. The fear is also present that the systems analysis approach could to some degree stifle creativity in the decision-making process.

Policy science is looked upon by the Council as a significantly flexible approach to encompass the political reality which plays a major role in decision-making. It is also considered to encourage a greater degree of imagination in looking for processes which could improve policy-making.

### Systematic Analysis

The review recognizes that the essential elements of systematic analysis are three-fold in nature. Firstly, objectives must be made explicit; secondly, the consequences of alternatives have to be weighed carefully; and lastly, a systematic process for decision-making and review has to be set up. In looking at these fundamentals in present government decision-making, the Council finds that they have been most successfully applied in the field of budgetary systems. The best known example has been the adoption of the Planning, Programming, Budgeting System. Here significant advances toward systematic and explicit decision-making have taken place and this had led to the creation of an equally important "climate for change". However, improvement in the government decision-making process demands comprehensive advances at provincial and municipal levels as well as at the federal level. While unable to conduct a thorough examination of decision-making at all three levels the Council concludes from a series of interviews of elected and appointed officials that progress in this area has been rather uneven and marked by "pockets of sophistication" at all government levels.

The review states that systematic analysis must not be regarded as a technique to provide simple answers to decision-makers' questions, but rather it can provide useful information to aid in the examination of problems. Sample survey techniques and greater use of computers can help decision-

makers understand social problems, but that understanding of policy analysis will not necessarily improve with the proliferation of these facilities.

Cost-benefit analysis can be a useful guide in choosing from alternatives, especially where benefits can be quantitatively evaluated. This type of analysis is not, however, particularly relevant to choosing among alternative benefits which are intangible in nature. Neither does this method take into account questions of a political or distributional kind which are inherent in evaluating alternative objectives for society. Simply increasing total expenditure on social services will not solve the problem. Inequities in social services can only be eradicated by decisions based on knowledge of distributional effects.

### A Framework for Government Decision-Making

Decision-making is defined by the Council as "essentially a process of choosing among alternatives" and that "it is essential to use the widest possible basis of relevant information and apply the best possible analytical techniques". Alternatives are chosen at three levels: objective or policy; policy or strategy; and programs or tactics.

Policy objectives must be continuously scrutinized to ensure that they do not depart from public sentiment, and the process must also contain a feedback mechanism so that objectives, policies and programs can be modified by experience. The Council notes the progress which has been achieved, particularly at the tactical level, but points out that more attention is required at the "higher levels" and also emphasizes the need for "a more systematic approach to the whole decision-making process".

Better information and more refined techniques will help improve judgement but what is really required is an improved method of examining the choices to be made and this can only come about as a result of "a continuous, conscious and deliberate weighing of alternative actions on the broadest possible basis of knowledge and participation". The bases on which government decisions are made will have to be made available to the public, if decision-makers wish to capture the imagination of the public and obtain "feedback".

Since many of a country's aspirations are abstract in nature and cannot be classified

into explicit objectives, the Council "strongly recommends the development of a comprehensive set of statistical measures to monitor the changing conditions of our society over a broad spectrum of concerns".

These measures, termed "goal indicators", should be designed to show aggregate changes and distributional effects of specific goal areas over time. They are accordingly classified into two types, "goal output indicators", and "goal distribution indicators". The Council believes that these two types of indicators offer significant possibilities for sharpening perceptions of society's needs, and that this concept can assist all levels of government in better identifying policy objectives.

Decision-making will also be greatly improved by wider distribution of knowledge and information among all participants in the decision process. The review is especially critical of the extent to which this process of broadening and encouraging involvement in public policy is taking place. It concludes that "by and large, the general public does not know, even after the fact, the arguments and evaluations on which public decisions are based".

### Conclusions and Recommendations

The review concludes that the "open, responsive, and systematic" examination of public policy is fundamental to the improvement of government decision-making at all levels. In order to encourage "wider and more pertinent discussion of goals, priorities, objectives and effectiveness of government policies" the Council recommends that:

- "Expert private groups and individuals participate in the difficult conceptual work required for the development of meaningful indicators;
- "Universities include more courses on the principles, processes and structures of government decision-making in their curricula;
- "An independent research institute concerned with the analysis of public policy issues be established;
- "Governments regularly publish and make widely available documents discussing current public policy issues and alternatives;
- "Governments proceed as quickly as is prudently possible to clarify the rights (and limitations) of the public to access to government information".



# Ontario Economic Accounts: A Dual Approach to the Measurement of Provincial Product

Patricia S. Fromstein, *Economist*  
Department of Treasury and Economics

Since 1969, the Economic Analysis Branch of the Department of Treasury and Economics has been engaged in a continuing research program to develop time series of the components of Ontario's gross output comparable to information available at the national level in the Canadian System of National Accounts. Estimates generated in the course of this project provide a valuable tool for quantitative economic analysis and form the indispensable data base for the development of econometric models of the Ontario economy.

The development of provincial economic accounts requires examination of a number of conceptual problems arising only at the sub-national level. Within the framework of an economic accounting system at provincial level, the development of an appropriate residence criterion for corporate business enterprises is of central significance since two basically different definitions of corporate residency must be considered.

One approach preserves the functional unity of corporations by using a "national" residence criterion, with the effect that a Canadian corporation operating in more than one province will have all of its establishments classified as residents of one province only. A number of appropriate bases of classification for this definitional treatment can be developed including head office location, place of incorporation or address for filing federal tax returns. A second approach advocated in the literature on regional economic accounting can best be described as "domestic" and allocates income and output of multi-provincial corporations among all those provinces in which permanent establishments are maintained. Each approach has ramifications for the statistical treatment of a number of items other than corporate income — notably, business investment and foreign and interprovincial trade.

Both approaches have advantages and disadvantages for particular analytic applications. In general, the "national" concept provides a more appropriate basis for examining interprovincial economic relations, while the "domestic" approach focuses on economic activity strictly within the geographic boundaries of the province.

The first set of Provincial Accounts developed by the Economic Analysis Branch was based on the "national" concept.<sup>1</sup> In order to supplement the information available in these Accounts and to provide a com-

prehensive picture of the Ontario economy, the Branch initiated work on a second set of income and expenditure estimates based on the "domestic" concept. Development of the "domestic" accounts allows research workers to select the aggregate measure most appropriate to their particular analytical needs.

This article presents a detailed description of the development of the Ontario Economic Accounts on a "domestic" basis and compares them with the "national" set. The first section of this study outlines the conceptual framework underlying the "domestic" accounts, while the second part describes the estimation procedures employed. The last section discusses the sectoral accounts and their structural relationships in comparison with the first set of accounts based on the "national" concept. The appendix contains annual estimates of the major components of Ontario income and expenditure for the years 1947 to 1969.

## THE CONCEPTUAL FRAMEWORK

As in the development of the "national" Ontario Accounts, the components of provincial output were estimated by decomposition of data from the Canadian National Accounts in order to provide a relatively long run of data with minimum time lag. As a result, the structural and conceptual framework of the Ontario Accounts is determined to a significant extent by the Canadian national accounting system and the Ontario "national" and "domestic" sets are quite similar in format.

Both sets of Ontario accounts identify six sectors: a personal sector; the various levels of government in Ontario; the business sector; the federal government; the rest of Canada; and the rest of the world. As was the case with the "national" set, it was felt that separate distinction of the three non-resident sectors was necessary to allow analysis of Ontario's economic status within the Canadian economy as well as the province's position in regard to federal-provincial transactions.

Most sectors are defined in exactly the same manner for both the "national" and "domestic" sets of accounts. Thus the personal sector comprises all private individuals and non-profit organizations resident in Ontario as determined by Statistics Canada for its provincial allocation of personal income. In accordance with current Statistics Canada

practice, public hospitals are included in this sector prior to 1961. The Ontario government sector is composed of all provincial and local government departments and agencies and public hospitals from 1961 on. Government business enterprises are assigned to the business sector on the grounds that their behaviour responds to different motivations from other public operations.

The treatment of the federal government is identical in both versions of the Ontario Accounts. Essentially, the federal government is defined as non-resident in Ontario and only those transactions between the federal government and the various Ontario sectors are recorded. All relations between the federal government and other non-residents of Ontario are considered outside the scope of the Provincial Accounts.

The major point of departure between the "national" and "domestic" versions of the provincial economic accounts stems from their different definitions of the Ontario business sector. Both include all unincorporated business located within the Province but their conceptual treatment of corporate business varies. The accounts on a "national" basis treat multi-regional corporations as single entities and ascribe their total operations to residence in one province only on the basis of the address of the District Taxation Office with which it files federal tax returns. Thus, all establishments of corporations submitting returns to District Taxation Offices in Ontario are defined as belonging to the Ontario corporate sector, regardless of where their production units are actually located. This approach preserves the functional unity of corporations and favors analysis of the type of corporate decision-making which generally takes place at the head office level for the enterprise as a whole. For certain industries, especially in the field of transportation, this treatment is more appropriate than a provincial allocation on a geographic basis. For example, it is difficult to conceive of the distribution of a trans-national railway into operating units. The "national" concept also has the advantage of allowing a more meaningful distribution of some intersectoral transfers.

However, there are certain analytic problems for which provincial data based on a geographically-determined criterion of residence are more valuable. For some purposes, "national" measures of provincial income and expenditure may be considered too

<sup>1</sup>M. V. Chari and R. H. Frank, "The Development of Ontario Economic Accounts", Ontario Economic Review, Vol. 8, No. 6 (Nov./Dec. 1970), pp. 5-17.



heavily weighted toward a province with a large concentration of corporate head offices. Research into the impact of provincial government policy especially may require measures of economic activity which conform strictly to the geographic confines which that government can affect most easily and directly.

Designed as an alternative to the "national" basis, the "domestic" set of accounts distributes corporations to each province in which they maintain a permanent establishment according to the allocation formula devised by the federal government for tax-sharing purposes. This approach is more compatible than the "national" with certain existing information such as the geographically-oriented public and private investment surveys published by Statistics Canada and with its intentions of expanding the collection of establishment-based data series. The "domestic" concept is more closely linked to the Ontario I/O Table and also has the advantage of allowing simplification of certain assumptions in regard to intersectoral transactions such as interprovincial wage payments by corporations.

The individual components of both sets of Ontario Accounts are essentially similar to those appearing in the Canadian National Accounts, but certain conceptual modifications appropriate to the provincial level have been introduced. One important difference between the Canadian and Ontario Accounts results from the definition of the federal government and residents of other provinces as non-residents for Ontario. Ontario's exports and imports for provincial accounting purposes must accommodate a number of federal-provincial and interprovincial factor payments which can be considered as wholly internal transactions at the national level.

Generally, the "domestic" approach requires fewer changes from the Statistics Canada conceptual treatment. In contrast to the "national" set, there is no need to attempt any estimation of interprovincial wage payments from business when the "domestic" approach is adopted because of the geographically-based definition of the Ontario business sector. It can safely be assumed that cases of labour resident in one province but employed by business located in another are of insignificant magnitude. However, the "domestic" approach still requires an adjustment for wage payments received from the federal government. These wages and salaries

paid by the federal government to Ontario residents must be included in the total of Ontario exports to non-residents.

As in the "national" set of Ontario Accounts, a departure is made from the Statistics Canada treatment of interest on the public debt. The Canadian system defines that portion of interest on the public debt which is paid to non-residents as a factor income on the grounds that it is not merely a transfer of money but represents a potential claim on domestically-produced output. Thus, at the national level these payments are recorded as part of the income of non-residents and are included in the total of Canadian imports.

In the Provincial Economic Accounts, all payments of interest on the public debt, whether paid to residents or non-residents, are treated as transfer payments. Interest paid by the Ontario government sector cannot be considered as conferring a claim on output produced solely in Ontario. Similarly, interest on the public debt received by Ontario residents from the federal government or from governments of the other provinces is not regarded as an addition to provincial product. As transfer payments, these items do not enter into any calculation of Ontario's exports and imports of goods and services.

The "domestic" Ontario Accounts depart from the "national" version in their treatment of capital formation and inventory investment. While the "national" set of accounts records these items on an ownership basis regardless of where the corresponding goods are actually located, the "domestic" approach with its geographically-based definition of the business sector considers only those assets physically situated within the province. This method conforms to the Statistics Canada national accounting treatment which defines investment on a domestic basis.

### ESTIMATION PROCEDURES

Both the "domestic" and "national" versions of the Ontario Economic Accounts follow Statistics Canada practice and estimate gross product using two approaches — one involving an aggregation of incomes received while the second measures total expenditures. The income approach sums a number of factor income receipts plus an inventory valuation adjustment to arrive at net provincial income at factor cost, which when adjusted for indirect taxes, subsidies, capital consumption allowances and miscellaneous valuation ad-

justments totals gross product at market prices. The expenditure approach aggregates all purchases by residents, the value of inventory investment and Ontario's trade balance to arrive at a gross expenditure total. In order to equalize these two measures, the statistical discrepancy between them is recorded as a "residual" error.

The Ontario Sector Accounts were developed by allocating each transaction appearing in the Canadian National Accounts into Ontario and non-Ontario portions. For classification purposes, all National Accounts transactions can be distributed into one of three distinct groups: transactions between two sectors; transactions between units of the same sector; and accrual items.

Intersectoral transactions at the national level can generally be regarded from either the recipient or the disbursing unit's point of view for purposes of provincial distribution. This implies that any intersectoral transaction can be disaggregated into four distinct components. Payments made by any Ontario sector can be distributed among Ontario and non-Ontario residents, while payments of any non-Ontario sector can be similarly treated as regards allocation among recipients.

As in the development of the "national" set of accounts, a two-way classification scheme was generally adopted in allocating all intersectoral transactions available at the national level. For certain items such as personal income and its main components, provincial distributions were available in the National Accounts. However, for others the provincial allocation had to be estimated on the basis of supplementary information generally available in published sources.

Once the marginal totals were established, the secondary distributions were made in accordance with auxiliary information consistent with the "domestic" concept. However, the establishment-based definition of corporate residence allowed certain simplifying assumptions to be made, thus reducing the number of items for which a complete four-way allocation had to be made. For example wages, salaries and supplementary labour income received from business by Ontario persons can now be assumed to be wholly generated *within* and *by* Ontario.

Transactions within a single national sector presented a special problem in the development of provincial accounts since almost all intra-sectoral transfers are as-



sumed to cancel each other at the aggregate national level and are not shown explicitly in the National Accounts. In both versions of the Ontario Economic Accounts, all intra-governmental transfers among the provincial and municipal governments (and hospitals from 1961 on) could be ignored in the consolidated account of the Ontario Government Sector. However, transfers received from the federal government had to be explicitly included in the revenue of the Ontario governments.

Due to lack of data on interprovincial trade, no complete estimate of intra-business purchases and sales of goods and services could be made on either the "national" or the "domestic" concept. While the "national" version tries to overcome this problem by identifying the value of trade in consumer and capital goods, the "domestic" set of accounts relegates the net intra-business trade balance to the residual. It is hoped that the future development of statistical series on interprovincial shipments of goods and services collected on an establishment basis will allow estimation of the complete trade universe compatible with the "domestic" concept.

Accrual components, which are transactions in an accounting sense only and do not represent payments between sectors or even between units within one sector, were treated in essentially the same manner as in the "national" set of Provincial Accounts. However, modifications were required to ensure that the data generated were logically compatible with the establishment-based definition of corporate residence. For example, in the "domestic" version, the Ontario corporate profit item attempts to measure all profit earned in Ontario with no attempt made to preserve the unity of any given corporation. The "domestic" distribution is based on information collected by the Department of National Revenue in conjunction with the processing of corporate tax returns.

Capital formation, inventory investment and capital consumption are also allocated on the "domestic" concept with location of physical assets as the determining criterion. Thus, estimates contained in the Ontario Economic Accounts on a "domestic" basis are compatible with the provincial distribution of private investment provided by Statistics Canada.

## THE SECTOR ACCOUNTS

As in the "national" set, the various inter-

sectoral and other components are grouped to form eight basic accounts for the province. A double-entry bookkeeping system ensures that total revenue (or receipts) is balanced with total expenditure (or payments) for each account.

The "domestic" sector accounts for Ontario conform more closely to the original rather than the revised presentation of the national accounts. The unrevised format was chosen as most susceptible to provincial allocation because of a number of conceptual and statistical limitations which arise in dealing with the detailed financial flows and the separate current and capital accounts of the revised format at the sub-national level.

### Current Account: Personal Sector

The credit side of this account gathers all incomes received by or accrued to all individuals and unincorporated businesses classified as resident in Ontario. The main components of personal income are defined in exactly the same terms as those in the National Accounts, although development of the Provincial Accounts necessitated a finer sectoral breakdown than is shown at the national level. The "national" and "domestic" versions of the personal account do not differ in aggregate terms, but the intersectoral allocation varies slightly.

As in the "national" Provincial Accounts, wages, salaries and supplementary labour income are allocated to Ontario and non-Ontario sources. However, the "domestic" approach assumes that business establishments located in any particular province employ residents of that province only and, therefore, all wage payments received by Ontario persons from business are treated as originating within the province. Intra-personal wage payments between Ontario and other provinces are also likely to be insignificant, as are factor income payments to Ontario persons from rest of Canada governments. These provincial and municipal governments with jurisdiction in other provinces are assumed to operate wholly outside of Ontario and to employ no residents of this province.

Both the "national" and "domestic" Ontario Accounts attempt no further sectoral distribution of net income of non-farm unincorporated business including rent and net income of farm operators from farm production on the assumption that they are generated solely within the province. The sources of interest, dividends and miscellaneous in-

vestment income of persons are analyzed as part of the Investment Income Appropriation Account.

The expenditure items of the Personal Account are balanced against total personal income by means of the personal saving component. Aggregate expenditure and saving are identical in both sets of Ontario Economic Accounts. Once again all items are broken down into payments to resident and non-resident sectors. However, in the "domestic" version, all purchases of consumer goods are assumed to be made from business establishments located in Ontario and therefore defined as belonging to the Ontario business sector. No account is taken of direct interprovincial purchases from business such as would be made by Ontario travellers in the rest of Canada. This approach precludes any identification of interprovincial trade in consumer goods from the viewpoint of the purchasing unit. Similarly, all transfers of interest on the consumer debt are assumed to remain within the province.

### Current Account: Government Sector

All current revenues and expenditures of the Ontario provincial and local governments, together with public hospitals from 1961 on, are combined in this account. As in the case of the personal account, the aggregates on the credit and debit sides are the same in both the "national" and "domestic" versions, with a slightly different intersectoral distribution for certain items. In the Ontario Accounts estimated on a "domestic" basis, both direct and indirect taxes paid by business are by definition collected only from the Ontario business sector; these components are here given similar treatment to taxes and other current transfers to government from persons.

Transfers received by the Ontario government sector from the federal government are explicitly shown as revenue. However, transfers between the various levels of government in the Ontario sphere cancel out in the consolidation process.

Government purchases of goods and services from persons and business are calculated net of government sales to these sectors. All sales to government by business are assumed to involve only Ontario residents. Similarly, subsidies to business are taken as paid to establishments operating within the geographical confines of the province. Interest on the public debt, however, is distributed among both resident and non-resident recipients.



The balancing item is the surplus or deficit on Current Account for all levels of government in Ontario taken together. The value of this item differs from the overall government surplus or deficit by the amount of government capital formation.

#### **Operating Account: Business Sector**

In this account the output of the Ontario business sector measured by revenue from sales of goods and services and the change in business inventories is balanced against the costs which determine the value of goods and services produced. Business activity as determined by total operating revenue and expenditure in the "domestic" set of Ontario Accounts differs from the aggregate of the "national" version because of the geographically-based definition of the business sector adopted here. While the units comprising the unincorporated portion of Ontario business are identical in both sets, the "domestic" corporate sector, unlike the "national", is composed of those establishments operating in Ontario with no attempt made to treat any given corporation as a single entity.

As in the "national" Provincial Accounts, severe data limitations prevented any sophisticated estimation of intra-business interprovincial trade in goods and services. Whereas in the "national" set an attempt was made to isolate certain interprovincial trade components by means of consumer purchases and

business trade in capital equipment, this project preferred to submerge all intra-business interprovincial sales and purchases in the residual error of the estimate until such time as a more complete estimate of trade between Ontario and the rest of Canada can be made.

#### **Investment Income Appropriation Account**

In both versions of the Provincial Accounts, this account serves to collect all investment income components and trace their disposition to the various sectors. The different definition of the corporate sector adopted in the "domestic" set affects not only the total of investment income but also the intersectoral distribution of the various items enumerated. One component which disappears completely is corporate retained profits accrued other than in the province of residence since the conceptual basis of the "domestic" accounts limits the corporate sector of any province to operations within that province.

#### **Provincial Saving and Investment Account**

This account aggregates the savings generated by all Ontario residents and distributes them between capital formation by the various sectors of the provincial economy and the net balances on account with non-residents. The two versions of the Saving and Investment Account differ in both the value of particular components and their inter-

sectoral distribution. The main differences have been outlined in the discussion of the four preceding accounts.

#### **Non-resident Sector Accounts**

Separate accounts for the federal government, the rest of Canada and the rest of the world can readily be generated from the other sector accounts.

#### **CONCLUSION**

In developing time series of income and expenditure at sub-national level, the problem of how to allocate the operations of multi-regional corporations becomes a major conceptual issue. Basically, a decision must be made either to treat each corporation as a single unit allocating all of its operations to one region or to distribute its activities among all regions in which the corporation maintains establishments.

Each approach has advantages which make it most appropriate for the analysis of particular economic problems. In view of the multiplicity of analytic applications for which income and expenditure data are required, the Economic Analysis Branch has developed a "domestic" set of Provincial Accounts supplementing the "national" version published earlier. The "domestic" series now allow researchers an added measure of flexibility in choosing data most suitable to their analytic requirements.



Table I — Provincial Income and Gross Provincial Product, 1947-1956

	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
	\$ millions									
1. Wages, salaries and supplementary labour income	2,654	3,099	3,340	3,616	4,259	4,771	5,154	5,268	5,696	6,421
2. Military pay and allowances	32	31	39	46	77	105	117	134	139	149
3. Corporate profits before taxes	756	810	810	1,096	1,236	1,207	1,212	1,071	1,391	1,608
4. <i>Deduct:</i> Dividends paid to non-residents	-152	-156	-192	-264	-246	-236	-232	-225	-251	-295
5. Interest and miscellaneous investment income	97	110	94	163	190	180	191	198	250	267
6. Accrued net income of farm operators from farm production	264	349	336	356	433	360	319	277	244	240
7. Net income of non-farm unincorporated business including rent	523	569	625	634	662	697	837	885	986	977
8. Inventory valuation adjustment	-229	-199	-32	-150	-264	48	4	35	-76	-103
9. <i>Net Provincial Income at Factor Cost</i>	3,945	4,613	5,020	5,497	6,347	7,132	7,602	7,643	8,379	9,264
10. Indirect taxes less subsidies	715	736	765	840	1,016	1,093	1,180	1,186	1,287	1,465
11. Capital consumption allowances and miscellaneous valuation adjustments	482	556	638	726	850	901	1,009	1,183	1,310	1,457
12. Residual error of estimate	+189	+161	+142	+151	+26	-173	-99	-277	-410	-259
13. <i>Gross Provincial Product at Market Prices</i>	5,331	6,066	6,565	7,214	8,239	8,953	9,692	9,735	10,566	11,927



Table I — Provincial Income and Gross Provincial Product, 1957-1969 (cont'd)

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
	\$ millions												
1. Wages, salaries and supplementary labour income	7,027	7,260	7,747	8,126	8,437	9,057	9,716	10,616	11,875	13,428	14,755	16,193	18,216
2. Military pay and allowances	165	172	170	172	189	201	206	208	205	229	250	256	291
3. Corporate profits before taxes	1,493	1,524	1,799	1,689	1,759	1,970	2,257	2,634	2,906	3,064	3,009	3,301	3,545
4. <i>Deduct:</i> Dividends paid to non-residents	-302	-298	-325	-309	-354	-381	-431	-495	-547	-587	-603	-611	-620
5. Interest and miscellaneous investment income	373	392	373	418	457	552	604	613	687	810	899	1,029	1,186
6. Accrued net income of farm operators from farm production	272	330	257	268	285	310	284	270	308	407	336	367	450
7. Net income of non-farm unincorporated business including rent	1,049	1,102	1,133	1,094	1,116	1,098	1,227	1,267	1,359	1,446	1,566	1,683	1,751
8. Inventory valuation adjustment	-25	-18	-47	-6	-19	-47	-94	-54	-139	-140	-139	-135	-247
9. <i>Net Provincial Income at Factor Cost</i>	10,052	10,464	11,107	11,452	11,870	12,760	13,769	15,059	16,654	18,657	20,073	22,083	24,572
10. Indirect taxes less subsidies	1,534	1,561	1,706	1,770	1,900	2,154	2,285	2,532	2,999	3,249	3,557	3,891	4,308
11. Capital consumption allowances and miscellaneous valuation adjustments	1,628	1,620	1,759	1,827	1,833	1,985	2,122	2,299	2,496	2,709	2,947	3,104	3,343
12. Residual error of estimate	-140	-425	-645	-621	-423	-793	-529	-552	-638	-335	-520	-561	-525
13. <i>Gross Provincial Product at Market Prices</i>	13,074	13,220	13,927	14,428	15,180	16,106	17,647	19,338	21,511	24,280	26,057	28,517	31,698

Table II — Gross Provincial Expenditure, 1947-1956

	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
	\$ millions									
1. Personal expenditure on consumer goods and services	3,593	4,080	4,386	4,743	5,333	5,814	6,198	6,383	6,882	7,429
2. Government expenditure on goods and services:	415	505	558	591	623	703	709	836	942	1,088
3. Current expenditure	307	366	417	425	434	474	490	576	651	742
4. Capital expenditure	108	139	141	166	189	229	219	260	291	346
5. Business gross fixed capital formation:	896	967	1,082	1,233	1,527	1,541	1,778	1,789	1,928	2,401
6. New residential and non-residential construction	392	525	625	739	842	864	1,031	1,090	1,224	1,453
7. New machinery and equipment	504	442	457	494	685	677	747	699	704	948
8. Value of physical change in inventories:	168	32	145	341	115	25	397	61	-83	248
9. Non-farm business inventories	162	39	138	188	196	10	333	-168	81	318
10. Farm inventories and grain in commercial channels	6	-7	7	153	-81	15	64	229	-164	-70
11. Exports of goods and services abroad	1,529	1,928	1,921	1,996	2,411	2,655	2,599	2,426	2,743	3,029
12. <i>Deduct:</i> Imports of goods and services from abroad	-1,223	-1,435	-1,563	-1,710	-1,974	-2,218	-2,367	-2,374	-2,604	-2,879
13. Exports of labour services to federal government	148	158	186	197	254	307	338	386	410	438
14. <i>Deduct:</i> Federal government investment income received from or accrued in Ontario	-14	-7	-9	-22	-28	-53	-52	-46	-68	-83
15. Dividends received from rest of Canada	58	52	57	85	88	87	75	67	82	90
16. <i>Deduct:</i> Dividends paid to rest of Canada	-50	-53	-57	-90	-84	-81	-82	-71	-76	-94
17. Residual error of estimate	-189	-161	-141	-150	-26	+173	+99	+278	+410	+260
18. <i>Gross Provincial Expenditure at Market Prices</i>	5,331	6,066	6,565	7,214	8,239	8,953	9,692	9,735	10,566	11,927



Table II — Gross Provincial Expenditure, 1957-1969 (cont'd)

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
	\$ millions												
1. Personal expenditure on consumer goods and services	8,154	8,732	9,147	9,478	9,655	10,320	11,062	11,758	12,898	14,216	15,447	16,633	18,111
2. Government expenditure on goods and services:	1,235	1,351	1,456	1,543	1,936	2,191	2,466	2,523	2,804	3,383	3,631	4,039	4,469
3. Current expenditure	772	871	956	1,057	1,453	1,575	1,779	1,883	2,002	2,449	2,734	3,136	3,557
4. Capital expenditure	463	480	500	486	483	616	687	640	802	934	897	903	912
5. Business gross fixed capital formation:	2,679	2,561	2,343	2,317	2,219	2,346	2,524	3,054	3,519	4,233	4,374	4,576	5,247
6. New residential and non-residential construction	1,620	1,719	1,464	1,395	1,342	1,363	1,469	1,709	1,845	2,258	2,376	2,681	2,972
7. New machinery and equipment	1,059	842	879	922	877	983	1,055	1,345	1,674	1,975	1,998	1,895	2,275
8. Value of physical change in inventories:	477	-114	56	91	397	-190	241	276	506	531	227	159	648
9. Non-farm business inventories	142	-80	200	24	249	104	276	205	558	444	165	200	297
10. Farm inventories and grain in commercial channels	335	-34	-144	67	148	-294	-35	71	-52	87	62	-41	351
11. Exports of goods and services abroad	3,064	3,032	3,250	3,414	3,671	3,999	4,496	5,232	5,657	6,587	7,243	8,507	9,318
12. <i>Deduct:</i> Imports of goods and services from abroad	-3,114	-3,239	-3,435	-3,538	-3,666	-3,943	-4,258	-4,663	-5,153	-5,769	-6,214	-6,835	-7,594
13. Exports of labour services to federal government	496	526	524	554	602	636	653	692	729	842	914	975	1,148
14. <i>Deduct:</i> Federal government investment income received from or accrued in Ontario	-60	-61	-59	-56	-63	-69	-80	-98	-96	-92	-105	-118	-189
15. Dividends received from rest of Canada	98	100	100	110	107	146	161	169	199	232	247	254	263
16. <i>Deduct:</i> Dividends paid to rest of Canada	-96	-93	-101	-107	-102	-123	-148	-157	-190	-219	-227	-235	-248
17. Residual error of estimate	+141	+425	+646	+622	+424	+793	+530	+552	+638	+336	+520	+562	+525
18. <i>Gross Provincial Expenditure at Market Prices</i>	13,074	13,220	13,927	14,428	15,180	16,106	17,647	19,338	21,511	24,280	26,057	28,517	31,698

Table III — Relation Between Net Provincial Income at Factor Cost, Personal Income, Personal Disposable Income, and Personal Saving

	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
	\$ millions									
1. Net Provincial Income at Factor Cost	3,945	4,613	.5,020	5,497	6,347	7,132	7,602	7,643	8,379	9,264
2. <i>Add:</i> Transfer payments (excluding interest on the public debt and transfers from Ontario corporations)	278	277	291	306	321	448	479	543	559	571
3. <i>Add:</i> Interest on the public debt	230	229	242	218	240	277	248	266	275	297
4. <i>Add:</i> Interest on the consumer debt	5	8	10	13	13	17	23	28	33	40
5. <i>Deduct:</i> Earnings not paid out to persons	—376	—463	—573	—648	—693	—977	—947	—863	—1,028	—1,172
6. <i>Equals:</i> Personal Income	4,082	4,664	4,990	5,386	6,228	6,897	7,405	7,617	8,218	9,000
7. <i>Deduct:</i> Personal direct taxes	—411	—439	—421	—415	—588	—721	—802	—821	—858	—1,014
8. <i>Deduct:</i> Other current transfers to government	—11	—13	—15	—15	—17	—19	—19	—19	—23	—33
9. <i>Equals:</i> Personal Disposable Income	3,660	4,212	4,554	4,956	5,623	6,157	6,584	6,777	7,337	7,953
10. <i>Deduct:</i> Personal expenditure on consumer goods and services	—3,593	—4,080	—4,386	—4,743	—5,333	—5,814	—6,198	—6,383	—6,882	—7,429
11. <i>Deduct:</i> Transfers to corporations	—5	—8	—10	—13	—13	—17	—23	—28	—33	—40
12. <i>Deduct:</i> Transfers to rest of the world	—18	—13	—12	—14	—17	—20	—22	—26	—28	—31
13. <i>Equals:</i> Saving of persons and unincorporated business	44	111	146	186	260	306	341	340	394	453

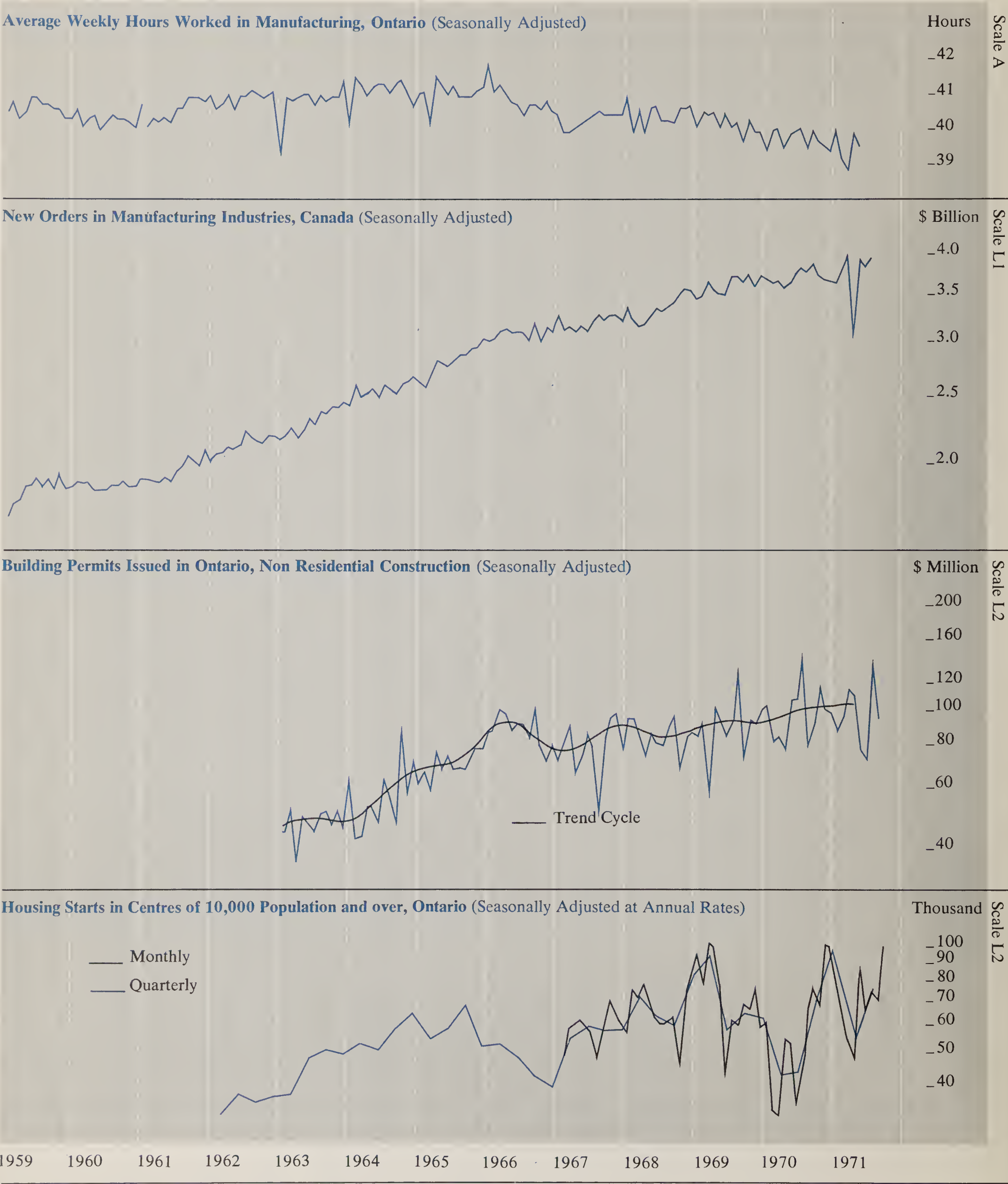


Table III — Relation Between Net Provincial Income at Factor Cost, Personal Income, Personal Disposable Income, and Personal Saving (cont'd)

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
	\$ millions												
1. Net Provincial Income at Factor Cost	10,052	10,464	11,107	11,452	11,870	12,760	13,769	15,059	16,654	18,657	20,073	22,083	24,572
2. <i>Add:</i> Transfer payments (excluding interest on the public debt and transfers from Ontario corporations)	672	834	968	1,066	889	939	1,004	1,070	1,160	1,291	1,646	1,929	2,209
3. <i>Add:</i> Interest on the public debt	280	303	384	405	436	473	501	553	598	653	695	754	843
4. <i>Add:</i> Interest on the consumer debt	47	52	63	73	74	79	82	88	103	117	126	139	161
5. <i>Deduct:</i> Earnings not paid out to persons	-1,141	-1,184	-1,409	-1,361	-1,373	-1,506	-1,677	-2,034	-2,162	-2,285	-2,225	-2,535	-2,681
6. <i>Equals:</i> Personal Income	9,910	10,469	11,113	11,635	11,896	12,745	13,679	14,736	16,353	18,433	20,315	22,370	25,104
7. <i>Deduct:</i> Personal direct taxes	-1,110	-1,020	-1,110	-1,266	-1,329	-1,418	-1,502	-1,736	-2,011	-2,579	-3,067	-3,668	-4,530
8. <i>Deduct:</i> Other current transfers to government	-35	-37	-128	-128	-136	-140	-147	-182	-223	-230	-221	-321	-430
9. <i>Equals:</i> Personal Disposable Income	8,765	9,412	9,875	10,241	10,431	11,187	12,030	12,818	14,119	15,624	17,027	18,381	20,144
10. <i>Deduct:</i> Personal expenditure on consumer goods and services	-8,154	-8,732	-9,147	-9,478	-9,655	-10,320	-11,062	-11,758	-12,898	-14,216	-15,447	-16,633	-18,111
11. <i>Deduct:</i> Transfers to corporations	-47	-52	-63	-73	-74	-79	-82	-88	-103	-117	-126	-139	-161
12. <i>Deduct:</i> Transfers to rest of the world	-36	-37	-40	-40	-36	-37	-42	-42	-44	-45	-55	-44	-49
13. <i>Equals:</i> Saving of persons and unincorporated business	528	591	625	650	666	751	844	930	1,074	1,246	1,399	1,565	1,823

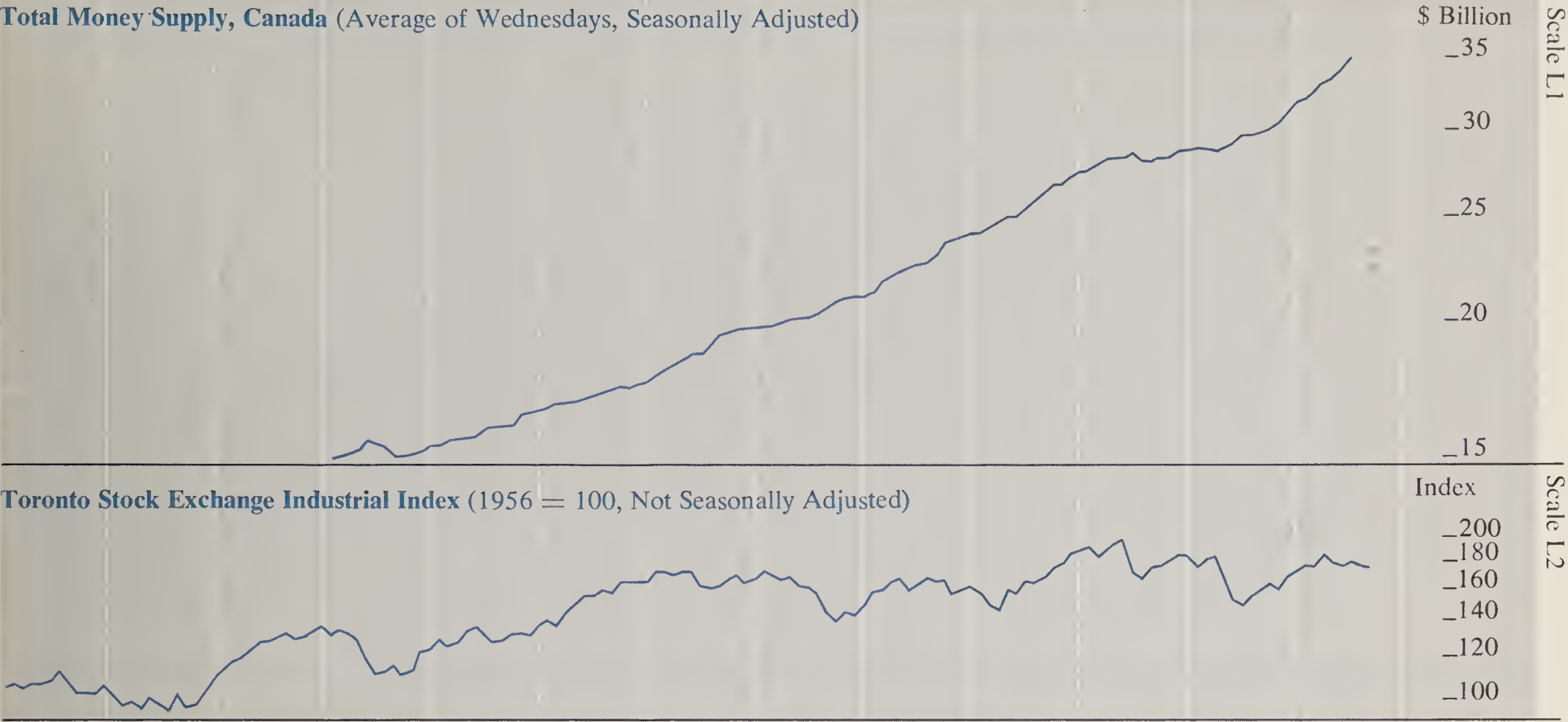
# Selected Economic Indicators

## Leading Indicators

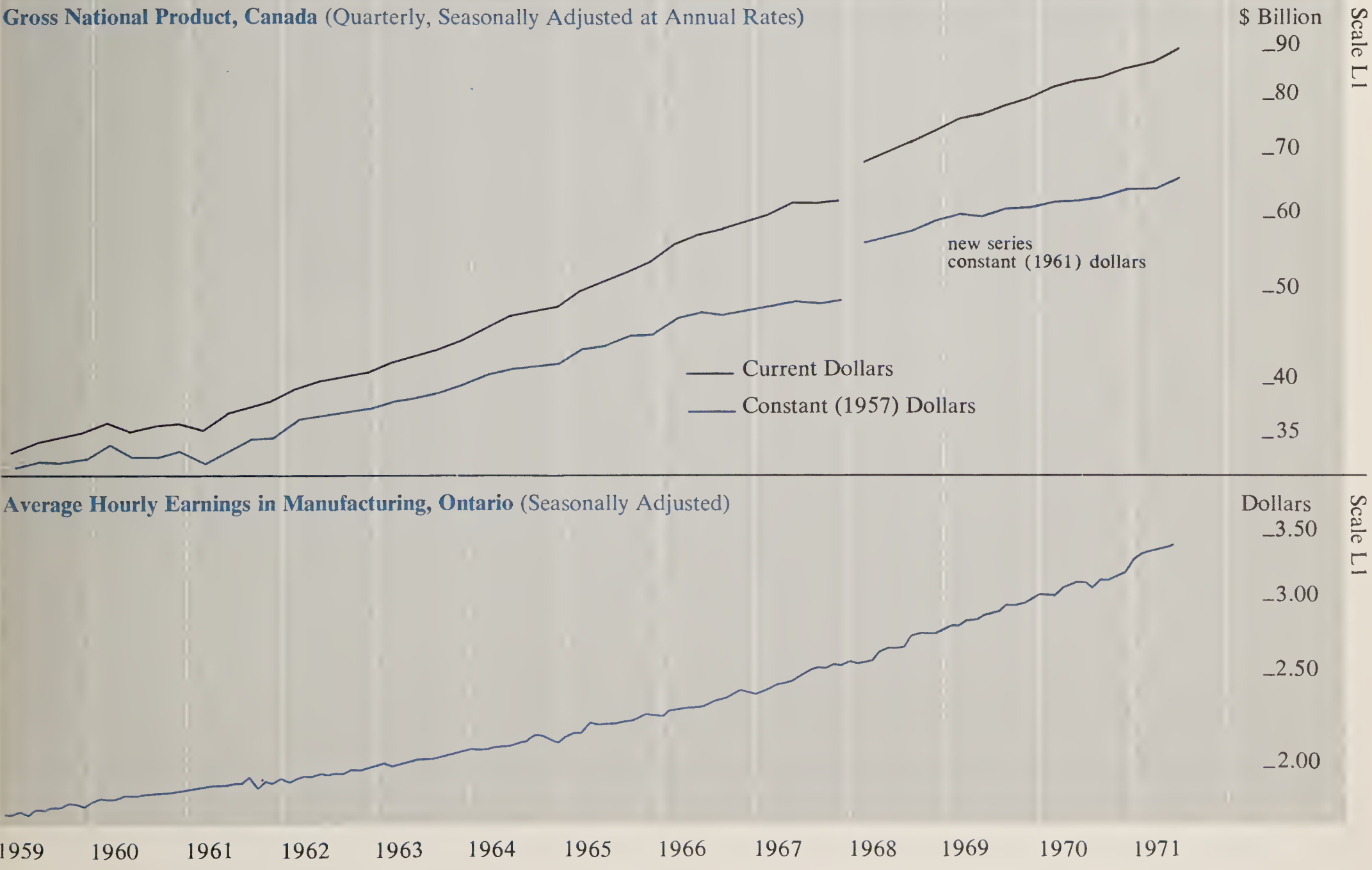




# Leading Indicators



# Coincidental and Lagging Indicators



# Coincidental and Lagging Indicators

**Average Yield of 3-Month Treasury Bills, Canada** (Last Wednesday of the Month, Not Seasonally Adjusted)

Per Cent  
Scale A  
\_8.0  
\_7.0  
\_6.0  
\_5.0  
\_4.0  
\_3.0  
\_2.0



**Employment, Ontario** (Seasonally Adjusted)

Million  
Scale L1  
\_3.25  
\_3.00  
\_2.75  
\_2.50  
\_2.25



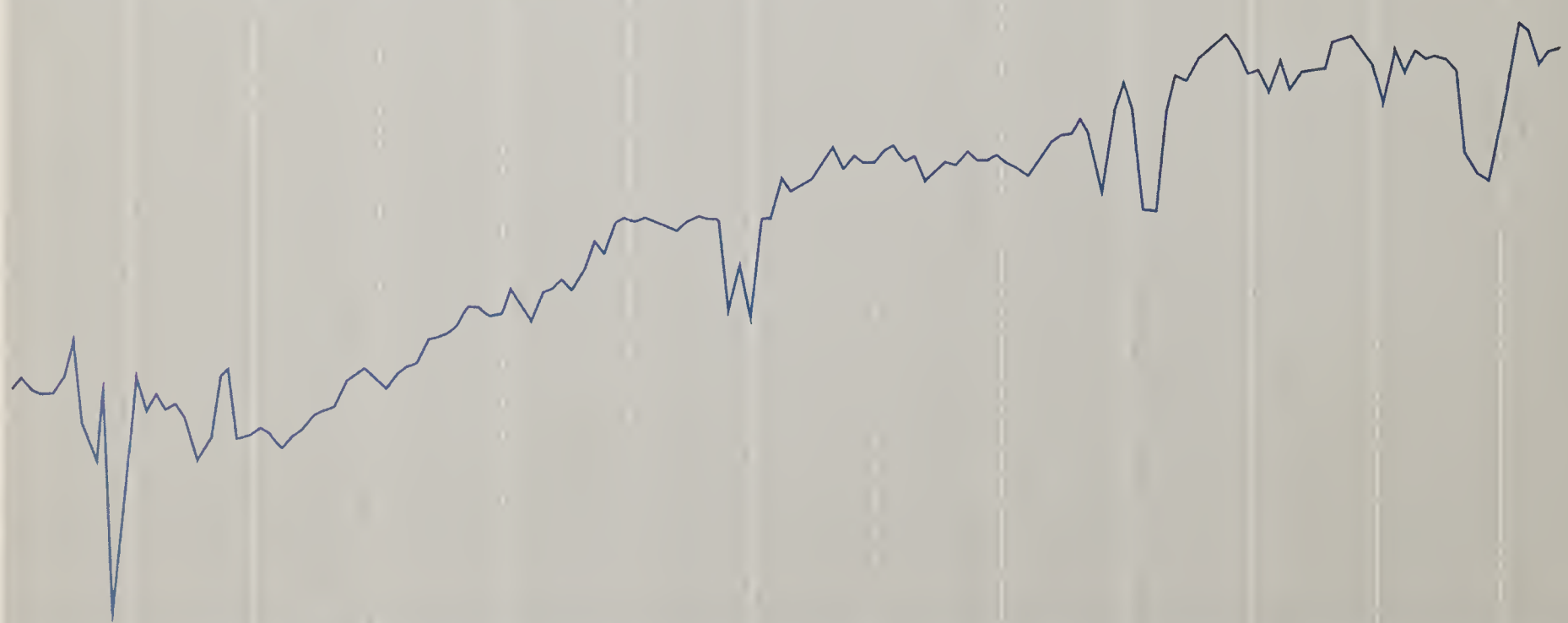
**Unemployment Rate, Ontario** (Per Cent of Labour Force, Inverted Scale, Seasonally Adjusted)

Per Cent  
Scale A  
\_2.0  
\_3.0  
\_4.0  
\_5.0  
\_6.0



**Index of Motor Vehicle Production, Canada** (1961 = 100, Seasonally Adjusted)

Index  
Scale L2  
\_400  
\_300  
\_200  
\_100  
\_70  
\_50



1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971

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	1970												1971												
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	August											
Leading Indicators																									
Average Weekly Hours Worked in Manufacturing																									
New Orders in Manufacturing Industries <sup>c</sup>		39.5	40.0	39.6	39.5	39.4	40.1	39.2	38.8	393	39.9	39.5	40.0												
Building Permits Issued in Ontario, Non-Residential Construction		3,804	3,883	3,754	3,697	3,689	3,686	3,885	4,034	3,097	3,975	3,896	4,001	3,963	4,229										
Urban Housing Starts (Annual Rate)																									
Money Supply <sup>c</sup>		81.6	93.8	120.3	103.1	100.0	90.6	97.0	117.5	112.0	77.1	73.3	138.1	91.5											
T.S.E. Industrial Index <sup>u</sup>		67,500	77,500	69,200	106,000	103,800	82,300	60,600	55,600	48,400	88,000	67,900	75,000	72,300	99,300										
Business Failures <sup>u</sup>		29,812	30,042	30,194	30,624	31,197	31,696	32,135	32,511	33,144	33,495	34,292	34,921												
Business Failures — Liabilities <sup>y</sup>		157.36	160.28	165.8	162.1	168.7	174.4	178.1	177.4	185.3	181.6	177.8	180.7	177.5	176.3										
		73	48	55	71	74	71	71	70	100	81	88	66	60											
		3.1	2.8	5.3	8.1	5.8	7.7	11.6	4.5	5.2	3.8	3.4	5.3	8.0											
Coincidental and Lagging Indicators																									
Gross National Product <sup>c</sup> (Annual Rate)				84,988			86,376			87,900				91,012											
Average Hourly Earnings in Manufacturing		3.22	3.22	3.18	3.21	3.22	3.33	3.37	3.40	3.43	3.43	3.49	3.47												
3-Month Treasury Bill Rate <sup>c,u</sup>		5.70	5.51	5.39	5.01	4.40	4.44	4.68	4.06	3.16	3.00	3.03	3.37	3.57											
Cheques Cashed in Clearing Centres <sup>1</sup>		6,358	6,774	7,184	6,945	6,475	6,553	6,589	7,190	7,956	7,519	7,062	7,110	7,457											
Retail Trade		918	902	930	896	903	910	900	941	947	995	992	989	983											
Labour Force		3,121	3,129	3,145	3,166	3,167	3,151	3,215	3,223	3,197	3,207	3,232	3,231	3,230	3,232										
Employed		2,976	2,996	3,003	3,030	3,020	2,996	3,042	3,054	3,040	3,023	3,052	3,067	3,083	3,071										
Unemployed		142	142	158	147	156	162	173	169	157	184	180	164	147	161										
Unemployed as % of Labour Force		4.5	4.5	5.0	4.6	4.9	5.1	5.4	5.2	4.9	5.7	5.6	5.1	4.6	5.0										
Wages and Salaries		1,584	1,601	1,596	1,600	1,611	1,618	1,646		1,673	1,693	1,721	1,730												
Index of Industrial Employment		131.1	131.7	130.2	130.0	129.7	132.0	131.5	132.2	131.7	131.5	132.7	134.6												
Index of Industrial Production <sup>c</sup>		170.0	171.0	169.1	168.6	171.5	170.5	171.7	172.9	172.5	171.2	174.7	175.7	176.3	178.7										
Total Manufacturing <sup>c</sup>		165.4	166.5	163.1	164.3	165.5	165.1	167.1	169.0	168.3	167.5	171.2	172.0	171.9	174.6										
Non-Durables <sup>c</sup>		152.8	151.8	152.2	152.0	155.3	152.9	152.7	150.3	150.5	150.1	154.1	155.1	154.7	156.1										
Durables <sup>c</sup>		181.7	184.4	176.4	179.9	178.4	180.6	185.3	192.7	190.9	189.4	192.8	193.5	193.7	198.1										
Mining <sup>c</sup>		173.4	174.6	178.2	175.4	186.7	180.9	177.4	176.0	176.6	174.4	179.3	180.6	184.0	183.1										
Electric Power and Gas Utilities <sup>c</sup>		206.1	205.9	208.4	195.0	194.8	201.0	203.2	201.9	202.2	198.5	197.4	198.6	202.1	206.7										
Primary Energy Demand (Annual Rate)		65.03	65.68	66.80	65.56	64.32	66.79	67.62	67.76	68.14	67.21	65.74	67.86	67.33	69.82										
Exports (including re-exports) <sup>c</sup>		1,422.7	1,321.1	1,391.3	1,416.0	1,479.8	1,312.0	1,442.0	1,395.0	1,506.0	1,397.0	1,463.6	1,550.0	1,457.0	1,601.0										
Imports <sup>c</sup>		1,187.5	1,162.3	1,184.5	1,006.0	1,138.0	1,020.0	1,128.0	1,181.4	1,338.8	1,181.2	1,279.9	1,344.0	1,321.0	1,389.0										
Unclassified Indicators																									
Foreign Exchange Reserves <sup>c,u</sup>		3,689	3,848	3,785	3,831	3,871	3,813	3,816	3,868	3,944	3,962	3,998	3,977												
Industrial Materials Price Index <sup>c,u</sup>		270.3	268.5	269.2	267.4	266.4	264.2	264.2	266.0	266.4	267.6	267.1	267.4	266.6											
Consumer Price Index <sup>c,u</sup>		130.5	130.5	130.2	130.3	130.3	129.8	130.3	130.9	131.3	132.2	132.7	133.0	134.1	135.0										

<sup>c</sup>Statistics for Canada.

<sup>u</sup>Not seasonally adjusted.

<sup>1</sup>Ontario less Toronto.



DEPARTMENT OF TREASURY  
AND ECONOMICS  
NOV - 3 1971  
POLICY PLANNING  
DIVISION





# Ontario Economic Review

**November/December 1971**  
**Volume 9, Number 6**

**Department of Treasury and Economics**

**Hon. W. Darcy McKeough, Treasurer of Ontario  
and Minister of Economics**

**H. Ian Macdonald, Deputy Minister**

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# Ontario Economic Review

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## Federal and Ontario Fiscal Policy in 1970 and 1971

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Bernard Jones and Jill Berringer  
Department of Treasury and Economics

## Selected Economic Indicators

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A publication of the  
Department of Treasury  
and Economics  
Government of Ontario

Hon. W. Darcy McKeough  
*Treasurer of Ontario and  
Minister of Economics*

H. Ian Macdonald  
*Deputy Minister*

The *Ontario Economic Review* is prepared and edited bimonthly in the Economic Analysis Branch of the Economic and Statistical Services Division, Department of Treasury and Economics. The review presents articles of interest as well as current information on economic activity in Ontario. Signed articles reflect the opinions of their authors and do not necessarily represent the views of the Department.

Subscriptions can be obtained free of charge by writing the Editor, *Ontario Economic Review*, Department of Treasury and Economics, Frost Building, Queen's Park, Toronto 182, Ontario.

### About the Review

In the past two years, the fiscal impact of the Ontario government in the provincial economy has been almost as pronounced, in relative terms, as that of the federal government in the Canadian economy. Accordingly, the Ontario budget has become a key economic document insofar as the short-term economic stabilization of the Ontario economy is concerned.

The feature article for this issue of the *Ontario Economic Review* traces the development of fiscal policy in Canada and Ontario over the past two years and reviews the influence of the economic setting on fiscal policy design. The article presents estimates of the current expansionary fiscal thrust of the total government sector in Canada, followed by a detailed review of recent federal and Ontario budgetary developments. It also compares and contrasts budgetary changes introduced at both levels to help stimulate economic recovery and to improve the unemployment situation.

The article was prepared by Bernard Jones and Jill Berringer in the Taxation and Fiscal Policy Branch, Department of Treasury and Economics. The authors acknowledge with appreciation the contribution of Christine Campbell in the preparation of the charts and tables.

### Indicator Charts, Pages 14-16

Fluctuations in aggregate economic activity — commonly used to define business cycles — do not necessarily correspond with fluctuations in the individual activities which make up the aggregate. Instead different indicators of economic activity may vary with respect to both their rates of growth and the timing of their peaks and troughs: some may grow more rapidly than others, some change direction sooner.

Those activities which tend to assume a direction in advance of the aggregate — because they relate to future rather than present production — are referred to as leading indicators, and are widely used to anticipate the short-run future course of the overall economy. The charts on pages 14-16 in the *Ontario Economic Review* present a number of these leading indicators, as well as several which are coincidental to or lag behind the aggregate, to provide for the reader an opportunity to make such an evaluation.

While comparisons of the timing and direction of general changes in the various indicators can readily be made, great care must be exercised in making such a comparison of the amplitude of fluctuations. Of the three vertical scales used — 'A' (arithmetic) and 'L 1' and 'L 2' (logarithmic scales with one and two cycles respectively over a given vertical distance) — only the logarithmic scales can be used to compare relative changes in different indicators. *And this applies only when all series being compared are on the same logarithmic scale.* In such a situation all parallel lines represent equal rates of growth, the exact rate of growth being determined by the slope of the line.



## Gross National Product, Third Quarter, 1971

The production of goods and services in Canada continued to increase in the third quarter of last year, but at a lesser rate than in the second quarter. Statistics Canada recently released preliminary results of the National Income and Expenditure Accounts for the third quarter of 1971 which show a continuation of the pattern of substantial gains in production evident since the fourth quarter of 1970. A feature of the third quarter was a sharp increase in the industrial sector, particularly noticeable in the indicators of production. However, the significant increase in the number of jobs created in the third quarter was not reflected in a significant decline in the unemployment rate due to an unusually rapid growth in the labour force. The implicit price index for GNP rose by 0.9 per cent compared with a 1.3 per cent increase in the second quarter.

Canada's gross national product, seasonally adjusted at annual rates, rose by \$2.3 billion in the third quarter to reach a level of \$93.7 billion. This gain was somewhat larger than that realized in the first quarter of \$2.0 billion, but considerably smaller than the \$3.0 billion increase in the second quarter. In percentage terms, GNP rose by 2.5 per cent in the third quarter after rising by 3.4 per cent in the second quarter, and by 2.3 per cent in the first quarter. After discounting that part of the increase in the value of goods and services due to higher prices, GNP rose by 1.6 per cent in the third quarter.

This is the fourth consecutive quarter showing a sizable gain in real output. GNP was 10.2 per cent larger in the third quarter of 1971 than for the corresponding period in 1970. Real growth during this time amounted to 6.9 per cent. A nine months comparison also shows an acceleration in the pace of economic growth. In the first nine months of 1971, GNP was 8.7 per cent larger in value and 5.3 per cent larger in volume than in the comparable period in 1970. This compares with a growth of GNP for 1970 over 1969 of 7.5 per cent in value and 3.3 per cent in volume. Under the assumption that no further growth in output took place last year the annual real growth of gross national product would be 5.6 per cent; if output grew by 1.0 per cent in the fourth quarter, the increase for the year as a whole would be 5.9 per cent.

Personal expenditure on consumer goods and services provided a major stimulus to demand in the third quarter though to a les-

ser extent than in the preceding quarter. Consumer spending rose by 2.0 per cent in the third quarter to \$54.17 billion compared with a 4.2 per cent rise in the second quarter.

Personal income and personal disposable income showed lower rates of increase in the third quarter than in the first two quarters of last year. This was especially true of personal disposable income that slowed to a growth of 1.4 per cent in the third quarter, after making impressive gains of 4.1 per cent in the second quarter and 3.0 per cent in the first quarter. Personal saving as a proportion of personal disposable income dropped to 8.0 per cent in the third quarter from 8.6 per cent in the preceding quarter.

A major source of weakness in economic activity in the third quarter was business spending on facilities, machinery and equipment, which had shown strong gains in the second quarter. In real or volume terms, business investment in machinery and equipment during the third quarter was unchanged from the second-quarter level. In non-residential construction, spending on new buildings increased. However, it was more than offset by a decline in engineering construction (other than highways and railways) which had risen quite sharply in the second quarter.

Consumer credit balances outstanding continued to rise in the third quarter, reaching a record \$11.75 billion. Also consumer credit as a proportion of personal disposable income rose to approximately 19.8 per cent compared with 19.5 per cent in the second quarter. This indicates consumers are increasingly willing to borrow to finance their expenditures on goods and services.

The continuing, but not outstanding pace of recovery in the third quarter occurred following a stimulating federal budget on June 18th. However, such stimulation is unlikely to have had immediate effects because of the time lags involved before cuts in personal and corporate taxes result in increased spending. The August 15th package of United States economic moves may have had a damaging effect on the economy's over-all performance in the July-through-September period but Statistics Canada says it is still too early to determine the extent. The latest GNP figures also appear to clearly indicate that the economy needed the stimulation provided in the October 14th federal budget: the introduction of temporary tax cuts of three per cent and seven per cent for individuals and corporations respectively.

At present the impact of the U.S. ten per cent import surcharge appears to have not been as severe as earlier expected. Federal Department of Industry, Trade and Commerce officials recently acknowledged a decline in exports to the United States of some commodities which were subject to the surcharge but refused to specify the commodities or companies involved.

Exporters affected by the surcharge generally attempted to maintain their level of exports in the hope that the surcharge would soon be removed or that they would be compensated, at least in part, under the federal Employment Support Act. This resulted in less reduction in exports and employment in some industries than was expected earlier.

The surcharge remained in effect for a little more than four months, however, it is not clear to what degree it affected Canadian industry. Federal officials say a comprehensive assessment of the surcharge's impact is not currently being attempted.

An accurate assessment of the impact of the surcharge on exports to the United States would be difficult because of the many factors affecting export trade. For many commodities it is impossible to separate the effects of the general downturn in U.S. economic activity in the past two years from the effects of the surcharge. Moreover, some exports subject to the surtax, such as machinery and capital goods, have long lead times on orders and contracts. Consequently the impact of the surcharge will be lagged and may not be felt for six to nine months. Some products are also produced and exported under long-term contracts, and therefore the effects might not be evident for some time, if at all.

The latest foreign trade figures indicate that the surcharge did not produce an overall reduction in exports to the United States. Seasonally adjusted exports to the U.S. have increased in each of the past three months and in October were approximately 13.0 per cent higher than in October, 1970. Cumulative exports to the United States in the first ten months of last year were nine per cent higher than a year earlier.

In one sector particularly, concern has been expressed over the probable adverse effects of developments during the past year-and-one-half. Canada's machinery and equipment producing industries, which are largely located in Ontario, have suffered a number of setbacks in the last eighteen months in their principal export market —



the United States. On June 1st, 1970 the Canadian dollar was freed and has subsequently appreciated to approximate parity with the U.S. dollar. On August 15th, the U.S. imposed a ten per cent surcharge on dutiable imports which affected approximately one-third of Canada's machinery exports to that country. The lifting of the ten per cent surcharge as the result of a major overhaul of world exchange rates that took place in Washington on December 8th will terminate the buy-American preferences in the U.S. investment tax credit plan. Future sales of Canadian machinery and equipment to the U.S. to a large extent now depend on what value the Canadian dollar takes relative to the devalued U.S. dollar.

Throughout the 1960's Canada achieved considerable success in adapting its machinery industry to modern markets. Export promotion, significant tariff reductions and the devalued Canadian dollar helped to stimulate this trade. As a result our machinery industries exported an increasing percentage of their products to the United States. Nearly two-thirds of the approximately one billion dollars worth of machinery and equipment Canada exported in 1970 went to the U.S. To the end of August this year Canada exported about \$440 million worth of these goods to the U.S., down moderately from the same period last year. This situation is attributable to both a poor U.S. market and the revalued Canadian dollar.

In the short run the good-will built up over the years between Canadian producers and U.S. buyers will probably help to maintain Canadian equipment exports. Also, prices have not always been the key consideration, particularly for machinery requiring custom design. Export figures for the last four months of 1971 will probably show the initial impact of the now eliminated surcharge and investment tax credit scheme. The true story will become evident this year when Canada may well lose a large percentage of machinery and equipment sales to the United States especially if the Canadian dollar moves ahead of its U.S. counterpart.

### The Labour Force

Mid-November labour force data for Canada, recently released by Statistics Canada showed little change between October and November on a seasonally-adjusted basis. The seasonally-adjusted rate of unemployment fell marginally to 6.6 per cent from 6.7 per cent in October. Actual unemployment

rose to 5.8 per cent from 5.1 per cent in the previous month. This was the highest rate since last June.

By regions, the seasonally adjusted unemployment rate decreased on the prairies to 4.5 per cent and increased in British Columbia to 6.9 per cent. The figure remained the same — 9.7 per cent — for the Maritimes. In Quebec, it dropped slightly to 8.4 per cent from 8.5. Ontario's unemployment rate stood constant at 5.6 per cent. The actual rates of unemployment in November stood at: 8.0 per cent in the Atlantic Provinces; 7.3 per cent in Quebec; 4.6 per cent in Ontario; 4.2 per cent on the Prairies and 7.1 per cent in British Columbia.

### Task Force Report on Foreign Investment

In late 1970, the Ontario Department of Treasury and Economics initiated the formation of a small interdepartmental task force to study the national, as well as provincial aspects of the issue of foreign investment and to propose policy alternatives for the consideration of the Ontario Cabinet. The Task Force was mobilized for two basic reasons. First the presence of a large degree of foreign investment in the Canadian economy has engendered much concerned public debate and necessitated that governments in Canada make explicit decisions on the problem. Secondly, since the Government of Canada has prepared a special study on the effects of investment from abroad and will submit recommendations for appropriate Canadian policies, it was felt that the background for such policies as might affect the Province of Ontario should be studied and defined so that the Provincial interest could usefully be presented in the ensuing debate.

The basic conclusion of the report suggests that Canadian policies should be re-evaluated with the objective of creating conditions more favourable to the growth of Canadian control of the economy and to the expansion of manufacturing industries relying on genuinely Canadian technology and product design.

The Task Force findings indicate that current inflows of direct investment from abroad do not play a major role in maintaining high levels of economic activity in Canada. In their opinion, only a relatively small reduction in the gross national product would result if new capital inflows ceased — provided of course, that the re-investment of present profits in Canada's foreign-controlled

sector remain at reasonably high levels. Due to the size of this sector of the Canadian economy, the maintenance of a healthy investment climate is considered fundamentally important to avoid a worsening of the present unemployment situation. Therefore, any new Canadian policies on foreign investment must incorporate a high degree of moderation.

The report emphasizes the essential need for the federal and provincial governments to define explicitly and collectively their policy orientations and to decide whether Canada should move towards continentalism or towards more reliance on indigenous Canadian initiatives. "It is only when this crucial direction of policy has been consciously and explicitly adopted that detailed strategies can be worked out to achieve objectives under the existing policy constraints."

The Task Force sees two workable alternatives for Canada's policy on foreign investment:

- a continuation of our present "open door" policy, and
- a movement towards moderate economic nationalism.

A continued "open-door" policy, as viewed by the committee, involves incipient threats to Canada's continued economic independence and its cultural distinctiveness. Moderate economic nationalism holds the promise of a gradual reversal of present trends without at the same time endangering economic stability.

Apart from recommending a moderate stance toward foreign investment in Canada, the report makes these recommendations:

- "Ontario's position on the foreign investment issue be presented to the Government of Canada as our contribution towards shaping an overall Canadian policy designed to meet the needs and aspirations of our citizens;
- "Moderation and flexibility be built into such a policy as necessary prerequisites to its successful implementation, and that
- "Radical measures aimed at Canadianizing industries at a fast pace be avoided as self defeating, primarily because they would engender fear and uncertainty and perhaps precipitate an investment crisis."

The Task Force was composed of six government economists from three departments: the Department of Treasury and Economics, the Department of Trade and Development, and the Department of Financial and Commercial Affairs.



# Federal and Ontario Fiscal Policy in 1970 and 1971<sup>3</sup>

Bernard Jones and Jill Berringer  
Department of Treasury and Economics

## INTRODUCTION

This paper traces the development of fiscal policy in Canada over the past two years. It reviews the key influence of the economic scenario on fiscal policy design, and to put recent fiscal policy developments in perspective, it presents rule-of-thumb estimates of the changing fiscal impact of the government sector in the economy. The paper emphasizes those changes in fiscal policy that have occurred at the federal and Ontario levels of government. In particular, it presents a detailed analysis of federal and Ontario budgetary changes.

The major focus of the paper is fiscal policy as an instrument for short-term economic stabilization. The importance of monetary, debt management, exchange rate and other policies in this regard is, of course, acknowledged, and mention of the influence of such policies will be made when appropriate. Nevertheless, this paper concentrates on recent budgetary changes introduced at both the federal and Ontario levels of government to help stimulate economic recovery and a substantial improvement in the unemployment situation. It does not, however, consider in any depth the balance of policies — or, if you like, policy-mix — appropriate to the longer-run attainment and maintenance of full-employment.

The specification of major economic performance goals must precede the design of fiscal and economic policy, and the major performance goals for Canada have been adequately specified by the Economic Council of Canada. In particular, the Council has estimated economic growth and employment goals.<sup>1</sup> Budget Paper A in the 1971 Ontario Budget contains parallel estimates for the Ontario economy.<sup>2</sup> Therefore, the first section of this paper begins with an outline of the goals of fiscal policy in Canada, followed by a terse review of the economy's performance relative to the achievement of the goal of "full" or "high" employment. This economic review is seen as the backdrop for the design and implementation of the present expansionary course of fiscal policy.

The second section of the paper discusses the importance of the budget as an economic document, and presents estimates of the current expansionary fiscal thrust of the total government sector in Canada, followed by a detailed review of recent federal and Ontario budgetary developments. It compares and contrasts the budgetary changes, as well

as presenting estimates of the changing fiscal impact of both levels of government. The third section discusses some important problems of short-term economic stabilization policy as evidenced in the second section of the paper.

## I ECONOMIC GOALS AND PERFORMANCE

### The Long-run Target of Economic and Fiscal Policy

The overall objective of economic and fiscal policy is to achieve high, sustained and non-inflationary rates of economic growth, high levels of employment, an equitable distribution of rising incomes and a sound external position. In the long-run, the optimum rate of economic growth that is consistent with the attainment of the other goals of economic and fiscal policy is the "full-employment" or "potential" growth rate. This particular rate of economic growth is the long-run target of economic and fiscal policy. For the Ontario economy it is estimated that relatively full employment is achieved when approximately 97.0 per cent of the labour force is employed and the per annum rate of increase in real gross provincial product is 5.5 to 6.0 per cent. For Canada, it has been estimated that the potential rate of growth is between 5.2 and 5.5 per cent with something less than 4 per cent of the labour force unemployed. The major explanation for the higher rate of potential growth of the Ontario economy is the more rapid increases in population and labour force.

### The Short-run Problem of Economic Stabilization

In the short-run, the actual rate of economic growth frequently diverges from its potential full-employment rate and causes undesirable fluctuations in the level of employment. Thus, the short-run target of economic and fiscal policy is the stabilization of the rate of growth of the economy around its potential rate. The problem of economic stabilization is to identify the causes of instability and design the appropriate policy-mix to restore stability. Fiscal policy — the main concern of this paper — is an important instrument of stabilization policy. However, it is used in conjunction with other policy instruments, the most important of which is monetary policy.

Stabilization policy is an art, not a science, and therefore, is imprecise. In fact "impre-

cise" is perhaps too kind a term to use. This particular form of art is frequently poorly practised, often being applied too late and in the wrong manner. The major difficulty arises from the fact that stabilization policy has to deal with conflicts inherent in its basic objective. Since 1969, as in the 1957-62 period, for example, there has been obvious conflict once again between the pursuit of less inflationary economic growth on the one hand, and the twin goals of high and sustained growth and full-employment on the other.

### The Economic Backdrop to the Expansionary Policies of 1970 and 1971

#### Fiscal and Monetary Policies of Restraint

The sharp deterioration in the economy's performance in 1970 was almost entirely attributable to the impact of severe deflationary federal fiscal and monetary policies.<sup>3</sup> According to our rule of thumb estimates, the federal national account's budget surplus on a full-employment basis increased substantially in 1969,<sup>4</sup> accounting for about two-thirds of the net restrictive fiscal impact of the total government sector. The Ontario fiscal impact was also restrictive in 1969 and reinforced federal efforts to reduce inflationary pressures.<sup>5</sup>

In addition to the tightening of fiscal policy, the rate of increase in money supply (broadly defined to include currency outside banks and all chartered bank deposits held by the general public) slowed considerably to 4.0 per cent in 1969, after increasing by 16.0 per cent and 13.0 per cent in 1967 and 1968 respectively. Despite the money squeeze, however, the demand for new credit

<sup>1</sup>See, *Economic Council of Canada, Performance and Potential mid-1950's to mid-1970's*, (Ottawa: Information Canada, September, 1970) and, *Performance in Perspective 1971*, (Ottawa: Information Canada, October, 1971).

<sup>2</sup>Hon. W. Darcy McKeough, "New Directions in Economic Policy Management in Canada", Ontario Budget 1971, (Toronto: Department of Treasury and Economics, April, 1971).

<sup>3</sup>The Economic Council had this to say about the restrictive impact of fiscal policy in 1968 and 1969: "The degree of fiscal restraint in Canada since 1968, however, has been very strong — much stronger than many Canadians have realized. In fact, in 1969, such restraint appeared to have been stronger than at any time since the Korean War in the early 1950's, when total demand was clearly excessive." *Performance and Potential*, p. 52.

<sup>4</sup>See page 6.

<sup>5</sup>See page 9.



that was satisfied by the available supply repeated 1968's record-high level. Consequently, the impact of monetary restraint on total demand was not great in 1969 even though interest rates rose to post-war highs.

### The Lagged Impact of Restrictive Policies

The inevitable lagged impact of monetary and fiscal policies of restraint appeared in 1970 when the level of domestic demand increased in real terms by only 0.7 per cent, compared with an increase of 5.9 per cent the year before. There was, of course, a consequent reduction in import demand and this factor, combined with unusual strength in foreign demand for Canadian exports and large net capital inflows — resulting partly from the high level of domestic interest rates and partly from external financial developments — forced the unpegging of the Canadian dollar in May, 1970. Over the next four months the external value of the Canadian dollar rose to a level close to par with the United States' dollar. It has remained at a relatively high value ever since.

### Actual versus Potential Performance

Chart I shows the deterioration in the performance of the Canadian economy since 1967 relative to its potential. The gap between actual and potential levels of constant dollar GNP has widened considerably over the period, reaching around 4.0 per cent of potential real GNP in 1970. The rate of real economic growth last year dropped to 3.3 per cent, from 5.1 per cent in 1969, in comparison to the potential growth rate of 5.5 per cent. The Ontario economy, of course, experienced a parallel deterioration in economic performance over the period.<sup>6</sup>

The rate of unemployment mirrored the

increasing shortfall of output below potential by rising sharply in Canada and Ontario. In Canada, the rate rose from 4.7 per cent in 1969 to a ten-year high of 5.9 per cent in 1970. In Ontario, it increased to 4.3 per cent in 1970 compared with 3.1 per cent the year before, but was on a sharply rising trend during the year.

Consequently, by the third-quarter of 1970 events over the 1965-70 period had retraced the "inflation-unemployment-high valued dollar" path of 1957-62. Broadly speaking, this was the economic climate that faced the policy-makers late in 1970 and in early 1971. It formed the economic backdrop to the expansionary shift in federal and Ontario fiscal policies discussed in Section II of this paper.

## II FEDERAL AND ONTARIO BUDGETARY DEVELOPMENTS IN 1970 AND 1971

### The Budget as an Economic Document

In view of the federal government's dominant role in economic stabilization in Canada, the federal budget, which is the fiscal instrument through which its stabilization policy is implemented, is a key economic document. It sets out in general terms the federal view of the current and prospective economic situation and details the fiscal plan that appears to be appropriate under the circumstances. Other levels of government, and the private sector, take account of the federal budget plan in making their economic decisions.

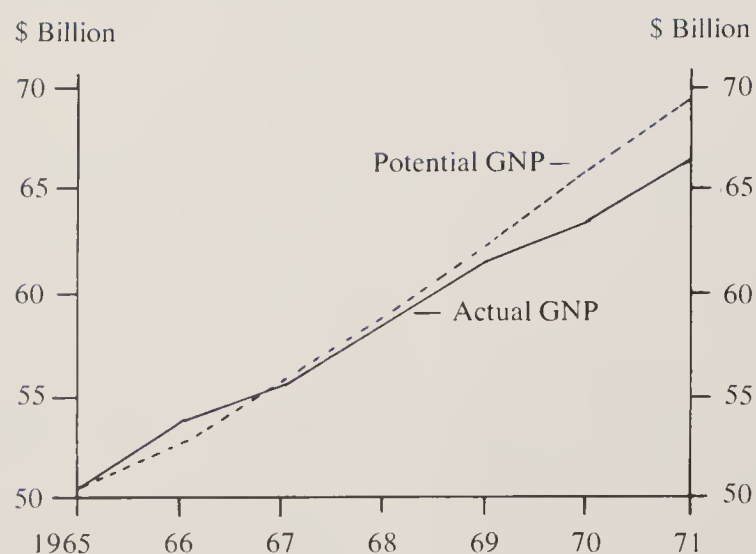
The provincial level of government has generally been viewed as playing a passive, or at best (or worst, depending on which side of the fence you are) moderately reactive

role in short-term economic stabilization. However, in its budget for 1971-72, the Ontario Government has presented a fiscal plan that contrasts sharply with this view.<sup>7</sup> A record-high budgetary deficit of \$553 million is planned, compared with a deficit of \$94 million last year. This increase in the budgetary deficit of \$459 million is proportionately much larger relative to the size of the Ontario economy than is the planned \$621 million federal swing relative to the size of the Canadian economy. In addition, the Ontario fiscal plan is based on the use of the full-employment budgeting technique described in this section. The full-employment budget estimates clearly and objectively demonstrate that the planned provincial budget will have a significant expansionary fiscal impact in 1972.<sup>8</sup> In fact, it will be argued later that *insofar as the short-term stabilization of the Ontario economy is concerned, the provincial budget is now just as important an economic document as that of the federal government.*

Budget plans frequently undergo substantial in-year changes. These are basically of two kinds. Firstly, there are changes that result from the influence on revenues and expenditures of variations in the level of economic activity from that originally anticipated. Such changes are *automatic* in the sense that they reflect the influence of the economy on the given budget plan which has not itself necessarily changed at all. Revenues from personal income taxes, for example, rise and fall with incomes (actually they do so to a proportionately greater degree due to the progressive nature of the personal income tax). Also, unemployment insurance and welfare benefit payments move inversely to the level of economic activity, rising when the economy weakens and vice versa. Secondly, there are changes arising from alterations to the basic fiscal plan itself. Tax rates may be changed, for example, or new expenditure programs introduced. These changes are *discretionary* in the sense that they change the impact of the original budget plan on the economy given any level of economic activity.

Analyzing past fiscal policy, or evaluating alternative budget plans for the current or future fiscal years, requires that these two kinds of influences be separated. In the following analysis of federal and Ontario budgetary developments in 1970 and 1971, a rough separation of automatic and discretionary influences is attempted using two different but complementary approaches.

**Chart 1 — Actual and Potential Economic Growth in the Canadian Economy, 1965-71 (1961 dollars)**



Source: Based on data published by Statistics Canada and estimates by Department of Treasury and Economics.

<sup>6</sup>Hon. W. Darcy McKeough, Ontario Budget 1971, p. 47.

<sup>7</sup>See, Hon. W. Darcy McKeough, Ontario Budget 1971, and Introduction to Supplementary Estimates and Tax Legislation, (Toronto: Department of Treasury and Economics, December, 1971).

<sup>8</sup>A reading of the Ontario Budget 1971 will show that the Province's acceptance of greater responsibility for short-term economic stabilization policy has arisen out of the failure of federal policies.



## Two Approaches to Analysis of Fiscal Policy

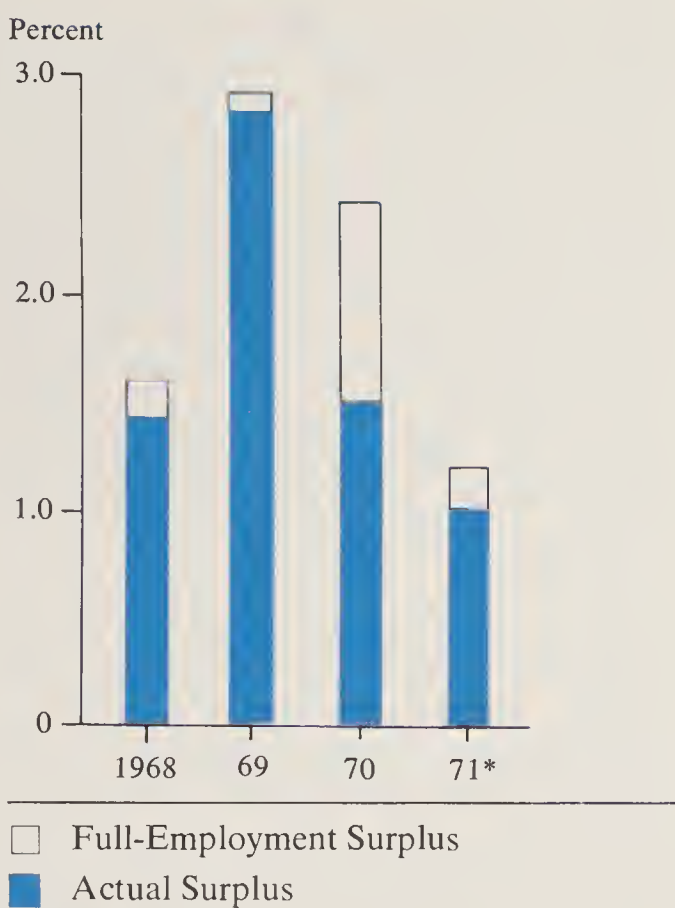
The first method estimates the change in the fiscal impact of the national accounts budget<sup>9</sup> measured on a full-employment basis. Its basic data source is the national income and expenditure accounts. Only the national accounts budget is defined in such a way as to make the transactions of the government sector directly consistent, in an economically meaningful sense, with the other major sectors of the economy. However, it excludes a substantial amount of purely financial transactions, such as loans and advances, which are included in the cash budget. Loans and advances do, of course, have an economic impact. Consequently, a comparison of changes in the national accounts and cash budgets is useful.

The second method traces in some detail the changes in budget plans, or forecasts, on both the administrative and cash budget bases. Its basic data source is the various budget statements and the public accounts. This approach is complementary in that it explains the changes in revenues and expenditures that bring about changes in the fiscal impact of the budget. More than that, it looks at the total cash requirements of government and thus gives broader coverage than the national accounts budget. Finally, it examines changes in budget forecasts and compares them with realizations.

The first method, by contrast, covers only actual developments in the national accounts budget measured on a full-employment basis. The major advantage of this approach is that it allows objective and consistent period-by-period comparison of fiscal impact.

The full-employment budget estimates may be made for the administrative, cash or national accounts budgets. The latter is generally used because of its particular economic significance; it represents a fair compromise between the narrower administrative and broader cash budgets. Basically, the full-employment budget estimates are made in the following manner; first, an estimate is made of the economy's potential GNP given that full-employment is achieved on a continuing basis; second, estimates are made of what the levels of revenues, expenditures and surplus\* would be at potential levels of GNP and, third, the actual surplus is compared with the full-employment surplus. The difference between the actual and full-employment surpluses measures the automatic influence on the budget of variations in the performance of the economy from its

**Chart 2 – Total Government Sector in Canada Actual and Full-Employment Surpluses, 1968-1971**  
(As a percent of potential GNP)



\*First-half seasonally adjusted at annual rates.  
Note: Both actual and full-employment surpluses are calculated on a national accounts basis, including CPP and QPP transactions. The full-employment estimates are derived by estimating the change in revenues that would occur if full employment were achieved; expenditures are assumed to be unchanged. For purposes of this analysis, full employment is assumed to be consistent with a level of employment of about 96 per cent and unemployment at about 4.0 per cent.

Source: Based on data published by Statistics Canada and estimates by Department of Treasury and Economics.

potential level of activity. The change in the full-employment surplus from period to period, measured as a per cent of potential GNP, gives the net expansionary or contractionary fiscal impact of the budget on the economy.<sup>10</sup>

The actual and full-employment surpluses of the total government sector in Canada over the period 1968 to 1971 are shown in Chart 2. The importance of separating automatic and discretionary budgetary influences in gauging the fiscal impact of the government sector can perhaps be better understood by reference to this Chart. Earlier, it was shown (see Chart 1) that the gap between actual and potential levels of economic activity widened considerably in 1970. Consequently, the auto-

matic influence of the weak performance of the economy on the combined budgets of all levels of government in Canada depressed revenues significantly below their potential levels. And, since expenditures are assumed to remain unchanged, the government sector surplus was also reduced below its full-employment level.

Chart 2, therefore, shows that the decline in the actual surplus in 1970 was much greater than that in the full-employment surplus. This is simply due to the fact that the reduction in the actual surplus comprises both the impact of expansionary discretionary influences and the automatic depressive influence of the economy on the budget. Both sets of influences worked together to reduce the surplus, but since only discretionary influences represent a change in the fiscal impact of the budget on the economy, the decline in the actual surplus in 1970 substantially overstates last year's expansionary fiscal swing. In fact, a close look at Chart 2 will show that the actual net fiscal impact in 1970 (the change in the full-employment surplus over 1969) is equivalent to about one-half of the reduction in the actual surplus.

In 1971, by contrast, the further decline in the actual surplus understates the expansionary impact of the government sector. The full-employment surplus has declined more rapidly than the actual surplus because the downward influence on the surplus of discretionary changes (reflected by the change in the full-employment surplus), has been partially offset by an automatic increase in revenues as the pace of economic growth picked up sharply in the first-half of this year.

The net fiscal impact of the total government sector in Canada is shown in Chart 3. It clearly illustrates the shift to expansion in 1970 and 1971. It will be shown later that the swing in federal policies is most respon-

<sup>9</sup>A detailed review and evaluation of the administrative, cash and national accounts budgeting concepts is contained in R. M. Will, *The Budget as an Economic Document*, *Studies of the Royal Commission on Taxation No. 1*, (Ottawa: Queen's Printer, 1966).

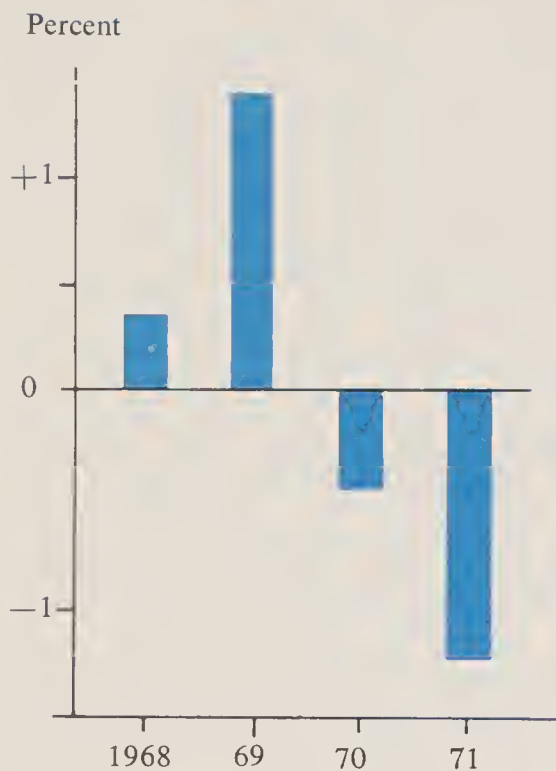
<sup>10</sup>For a useful introductory note on the use and interpretation of the full-employment budget, see R. Solomon, "A Note on the Full-Employment Budget Surplus", *Review of Economics and Statistics*, XLVI (February 1964), pages 105-108. A detailed theoretical and statistical treatment of the concept is found in M. Levy, *Fiscal Policy, Cycles and Growth*, *National Industrial Conference Board, Studies in Business Economics*, No. 81 (New York: The Conference Board, 1962).

\*Note: For the sake of brevity the term 'surplus' will be applied, in instances where the context is clear, to cover either true surpluses or negative surpluses (deficits).



sible for this development, as it was for the period of restraint in 1969.

**Chart 3 — Total Government Sector in Canada Net Fiscal Impact, 1968-1971**  
Contractionary (+) or Expansionary (—)  
(As a percent of potential GNP)



Note: The net fiscal impact measures the year-to-year change in the relative full-employment surplus shown in Chart 2.

Source: Based on data published by Statistics Canada and estimates by Department of Treasury and Economics.

### Federal Budgetary Developments in 1970 and 1971

#### Full-Employment Budget Estimates

The federal full-employment surplus on a national accounts basis, over the period 1968-71, is plotted as a percentage of potential GNP in Chart 4. The year-to-year changes in the relative full-employment surplus, which are shown in Chart 5, measure the net fiscal impact of the federal budget. That is, the net infusion or withdrawal of funds by the federal government (reduction or increase respectively in its full-employment surplus) is measured relative to the full-employment potential performance of the economy. The automatic influences of the economy on the budget are removed and the changes unambiguously represent discretionary influences only. It is quite clear from Chart 5 that the planned fiscal impact in 1971-72 of the federal national accounts budget on a full-employment basis is more expansionary than that of 1970-71. It is

equally clear that the expansionary thrust of the past two years has been necessary to reverse the very restrictive fiscal policy posture of 1969.

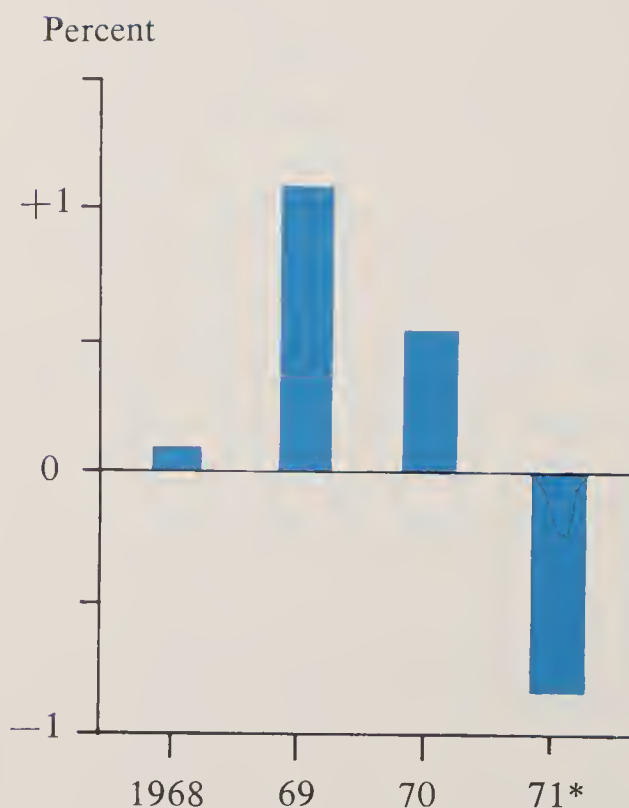
#### Budget Plans versus Realizations

The clearest illustration of the federal government's *intention* to strengthen its fiscal impact on the economy during 1970 and 1971 is provided by examining changes in federal *forecasts* of budgetary and total cash requirements<sup>11</sup> during the two fiscal years. To trace the details of changes in the *actual* fiscal impact of the federal government's budget, however, it is necessary to examine *actual* budget changes. Both forecasted and actual changes, which are summarized in Table 1, are discussed below.

#### Original Federal Fiscal Program for 1970-71

The fiscal plan for 1970-71, presented in the March 12, 1970 budget,<sup>12</sup> was a continuation of the previous year's restrictive policy which aimed at reducing inflationary pressures. It contained an extension to the end of 1971 of an earlier decision to defer depreciation allowances on new commercial projects in

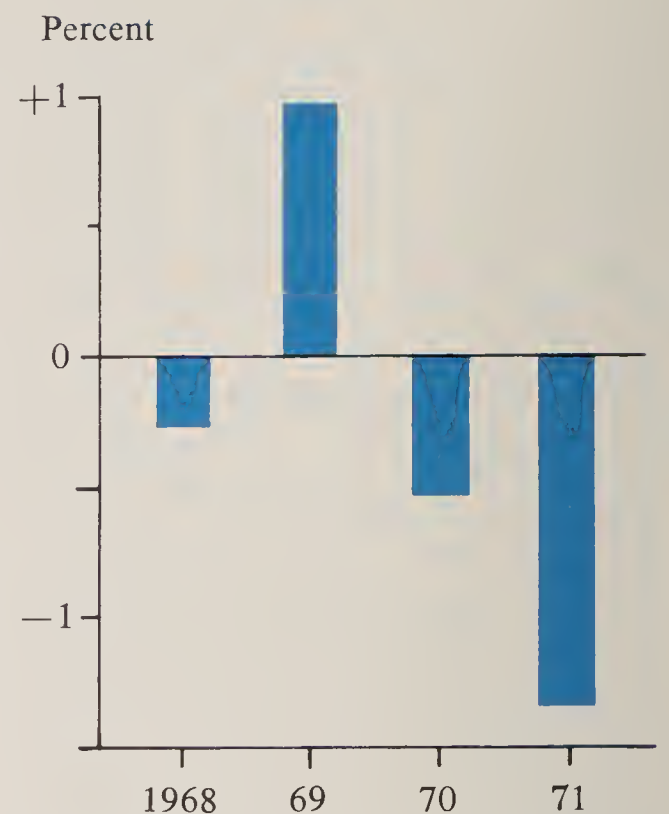
**Chart 4 — Federal Government Full-Employment Surplus, 1968-1971**  
(As a percent of potential GNP)



\*Estimated impact per October 14 budget.  
Note: For explanation, see Chart 2.

Source: Based on data published by Statistics Canada and estimates by Department of Treasury and Economics.

**Chart 5 — Federal Government Net Fiscal Impact, 1968-1971**  
Contractionary (+) or Expansionary (—)  
(As a percent of potential GNP)



Note: The net fiscal impact measures the year-to-year change in the relative full-employment surplus shown in Chart 4.

Source: Based on data published by Statistics Canada and estimates by Department of Treasury and Economics.

selected urban centres, including metropolitan Toronto. In addition, it included a provision for the implementation of consumer credit controls. In the first-quarter of 1970 the volume of consumer credit outstanding actually declined, however, and this provision was subsequently dropped. This budget, although forecasting a small reduction in the budgetary surplus from \$355 million in fiscal 1969-70 to \$300 million in fiscal 1970-71,<sup>13</sup> was clearly not intended as an expansionary budget.

The weight of financial policy in the early months of 1970 was also firmly directed at reducing inflationary pressures. The Governor of the Bank of Canada, in his annual report for 1969, stated, "... at the present time inflation is the foremost economic problem of the country as a whole".<sup>14</sup> By mid-1970, however, it had become obvious that a general slowdown in the economy was occurring. Major weaknesses had developed in output and employment, and the prospect of a significant rise in the external value of the Canadian dollar added a further bearish touch to the outlook.

<sup>11</sup>All references to total cash requirements will be exclusive of cash required for foreign exchange transactions.

<sup>12</sup>Hon. Edgar J. Benson, Budget Speech, (Ottawa: March 12, 1970).

<sup>13</sup>For the purposes of this paper, the original surplus of \$250 million for 1970-71 has been adjusted upwards by \$50 million due to the non-implementation of consumer credit controls. Therefore, the following discussion proceeds on

the basis that the March 12 budget surplus was \$300 million.

<sup>14</sup>L. Rasminsky, Bank of Canada Annual Report for the Year 1969, (Ottawa: February 28, 1970), p. 9.



**Table 1 — Government of Canada Financial Position, Fiscal 1970-71 and 1971-72**  
(Millions of dollars)

	1970-71				1971-72		
	Mar. 12/70 Forecast	Oct. 13/70 Forecast	Dec. 3/70 Forecast	Final	Dec. 3/70 Forecast	Jun. 18/71 Forecast	Oct. 14/71 Forecast
<b>Budgetary</b>							
Transactions:							
Revenues	13,200*	13,100	13,035	12,803	n.a.	13,660	13,580
Expenditures	12,900	13,250	13,355	13,182	n.a.	14,410	14,580
Surplus (+) or Deficit (—)	+300	—150	—320	—378		—750	—1,000
Net Non-budgetary Deficit (—)	—775	—1,185	—1,250	—804	n.a.	—1,680	—1,600
Total Cash Requirements (—) (excluding requirements for foreign exchange transactions)	—475	—1,335	—1,570	—1,182	—2,100	—2,430	—2,600

Source: Receiver General for Canada, Public Accounts of Canada, Volume 1, and budget speeches.

\*Adjusted for the non-imposition of consumer credit controls.  
The original forecast estimated a \$50 million revenue loss and a budgetary surplus for 1970-71 of \$250 million.

Figures may not add due to rounding.

### Revisions to Federal Fiscal Position for 1970-71

To expand its fiscal impact on the economy, the federal government introduced a stream of increases in budgetary and non-budgetary expenditures in June, October and December of 1970, but no reductions in taxes occurred. The June measures<sup>15</sup> included the following major items: increased equalization payments (\$100 million); accelerated tax collection payments to the provinces (\$150 million); an increase in the CMHC budget (\$100 million); and a summer employment program. These measures were supplemented in October<sup>16</sup> by an accelerated disbursement of funds under the Technical and Vocational Training Schools Program (\$75 million), and an additional expenditure directed specifically at regional unemployment (\$60 million).

As of October 13, 1970, the forecast of budgetary revenues (see Table 1) was reduced by \$100 million due to the automatic influence of the weaker-than-expected performance of the economy on incomes and hence tax revenues. Budgetary expenditures, on the other hand, were increased by \$350

million, producing a prospective deficit of \$150 million for the year instead of the surplus of \$300 million forecast in March. There was also an increase in net non-budgetary requirements of \$410 million.

The increase in total cash requirements from March to October was \$860 million, compared with original requirements for the year as a whole of \$475 million. Consequently, as shown in the table, total planned cash requirements for the year rose to \$1,335 million. With the exception of: (i) the automatic reduction in revenues to the tune of \$100 million, (ii) exchange fund profits of \$140 million, and (iii) the automatic increases in expenditures due to higher than forecast unemployment and welfare case loads, the planned increase in cash requirements of \$860 million was substantially discretionary (amounting to something less than \$600 million) and was a direct policy response to the deteriorating economic situation.

Toward the end of the year, the federal government began emphasizing the *adaptability* of federal fiscal policy: that is, the desirability of introducing changes to bud-

gets whenever appropriate rather than simply at the start of the fiscal year. And, on December 3, 1970,<sup>17</sup> still further expansionary measures were introduced including: a \$150 million loan fund to the provinces; additional spending by government departments and agencies on capital improvements (\$23 million); an increase in the capital budget of CMHC (\$40 million); supplementary unemployment insurance benefits from January to June, 1971, and a capital cost allowance incentive to businesses engaged in manufacturing and processing.

However, taxes were kept at previous levels by *extending the surtaxes on personal and corporate incomes through 1971*. This change added about \$61 million<sup>18</sup> to tax revenues in the last quarter of the fiscal year. Nevertheless, revenues were now estimated at about \$165 million below the original budget due to a further revision since October of the expected performance of the economy. In effect, the total automatic adjustment in revenues amounted to \$226 million. Of the total increase in planned cash requirements of \$235 million since October (see Table 1), probably no more than about \$100 million was due to discretionary increases in spending. The total planned net infusion of additional funds between March and December thus amounted to around \$700 million.

In the final analysis, however, budgetary revenues and expenditures for fiscal 1970-71 were both lower than estimated in December, 1970. Revenues turned out to be \$397 million below the original March forecast despite the extension of the surtaxes which, as noted previously, added about \$61 million. Therefore, the total automatic influence of the economy's poor performance on the original budget revenue plan was around \$450 million.<sup>19</sup> Also, there were evidently considerable delays in implementing changes on the expenditure side. Budgetary expenditures for the year turned out to be lower than even the October estimates and non-budgetary requirements, which in December were estimated at almost \$500 million above the March forecast, were only marginally higher in the final analysis than originally anticipated. There is no satisfactory official explanation for these substantially reduced levels of actual compared with intended spending. The explanation offered by the federal Minister of Finance, Mr. Benson, in his June 18, 1971 Budget speech is:

<sup>15</sup>Hon. Edgar J. Benson, Report to the House of Commons on the Federal-Provincial Conference, June 5-6, Winnipeg, (Ottawa: Department of Finance, June 8, 1970).

<sup>16</sup>Hon. Edgar J. Benson, Statement on Economic Policy, (Ottawa: Department of Finance, October 13, 1970).

<sup>17</sup>Hon. Edgar J. Benson, Budget Speech, (Ottawa: December 3, 1970).



"Whether certain payments will fall into one fiscal year or the next is always subject to some uncertainty as the calendar is rigid, but the progress of payments in relation to on-going and expanding programs is less rigid. The increase in our total cash requirements was some \$500 million less than I indicated in my budget of last December because of such factors. In respect to some categories of spending these differences were fairly large, but there were offsetting changes in respect of others. The impact of the economic programs of the government upon the economy was not, however, materially affected by these rather technical matters of timing."<sup>20</sup>

In conclusion, although the introduction of substantial in-year increases in forecast expenditures and total cash requirements gave the impression of an increasingly expansionary thrust during fiscal 1970-71, the actual outcome resulted in a relatively minor discretionary increase in total cash outlays. Of the actual increase in cash requirements over the original budget of \$707 million (\$1,182 million less \$475 million), over half of the increase was absorbed by the automatic \$450 million revenue loss and part of the balance would inevitably have been taken up by the automatic increase in expenditures to cover higher than expected levels of unemployment. Consequently, the 'adaptability'

of federal fiscal policy in fiscal 1970-71 was limited to changes in *intended* levels of revenues and expenditures and, because of a long implementation lag, *it lacked the flexibility to bring about a significant economic impact in the short run.*

### Original Federal Fiscal Program for 1971-72

The federal fiscal plan for 1971-72 has shown a similar tendency to planned in-year expansion in 1970-71 (see Table 1).

The first estimate for the fiscal year was revealed in the December 3, 1970 budget which stated that overall cash requirements for the year would be \$2,100 million. No further details were given at that time. This amount represented a planned increase of \$530 million over the figure of \$1,570 million then forecast for fiscal 1970-71. However, since the final cash requirements for 1970-71 were \$1,182 million, and cash requirements for 1971-72 in fact increased in June and October, a substantial carry-over of unrealized 1970-71 spending intentions into 1971-72 has occurred.

The June 18, 1971 budget<sup>21</sup> gives the first detailed presentation of the fiscal plan for 1971-72. A budgetary deficit of \$750 million was forecast, net non-budgetary requirements were expected to total \$1,680 million, and total cash requirements thus were forecast at \$2,430 million. This forecast figure was \$1,248 million higher than actual requirements for the previous fiscal year. About one-third of this increase is accounted for by the large carry-over of unrealized 1970-71 spending intentions.

In contrast to budgetary developments during 1970-71, which were designed to expand public rather than private spending, the June budget introduced measures principally to encourage confidence and spending in the private sector of the economy. Among these measures were removal of the personal and corporate income surtaxes and extension of tax relief at lower income levels (for a total infusion of funds to the private sector of \$175 million), reductions in the excise tax on radio and television sets, etc. (\$40 million), and withdrawal of the sales tax on anti-pollution equipment and margarine (\$15 million). Undoubtedly the experience of fiscal 1970-71, ie. continued rising unemployment, has suggested to the federal government that primary reliance on planned increases in public spending, particularly in arm's length categories, is not an effective way of stimulating the economy in the short term.

### Revisions to Federal Fiscal Policy Program for 1971-72

The October 14, 1971 "emergency" budget<sup>22</sup> was intended to reinforce the thrust of the June budget. A program consisting of a series of expenditure increases and tax cuts was proposed. Expenditures and disbursements were increased by approximately \$500 million with the introduction of the following measures: a \$100 million Local Initiative Program; an expansion of Canada Manpower Training Programs (\$35 million); the establishment of another \$160 million Special Development Loan Fund to the provinces; an acceleration in CMHC loans (\$113 million), and an expansion of federal capital works projects (\$80 million). The tax cuts consisted of a temporary 7.0 per cent reduction in the federal corporate income tax, and a temporary 3.0 per cent cut in the federal personal income tax, both effective July 1, 1971 until the end of 1972. The corporate tax cut is expected to cost the federal government \$160 million in revenues in fiscal 1971-72, and the cut in personal taxes a further \$125 million in the same period.

These emergency measures have increased the planned budgetary deficit by \$250 million from the June forecast, to a total of \$1 billion for 1971-72, and total cash requirements from \$2,430 million to \$2,600 million. Total revenues for fiscal 1971-72 are forecast at only \$80 million lower than the earlier June estimate despite the \$285 million tax cut, as revenues have been considerably more buoyant than anticipated in previous budget forecasts.

All in all, planned total cash requirements for 1971-72 have increased by \$500 million over the December 3, 1970 estimate of \$2,100 million. The forecast of revenues has increased by over \$200 million due to the better than expected performance of the economy. Consequently, the total planned increase since December, 1970 in the discretionary fiscal thrust for 1971-72 is around \$700 million. In fact, the carry-over of unrealized 1970-71 spending intentions expands this thrust considerably to an amount of well over \$1 billion. Thus, the fiscal impact in 1971-72 will be substantially larger than that in 1970-71 provided there is no large carry-over into 1972-73. Some carry-over is, of course, inevitable, particularly since there is still considerable emphasis on expenditure packages similar to those introduced around the same time last year.

<sup>18</sup>The figure of \$61 million represents one-quarter of the total estimated revenues from the surtaxes in 1971. However, because of the timing of collections, particularly in the corporation tax, the final figures for the last quarter of fiscal 1970-71 may be somewhat less.

<sup>19</sup>It is interesting to note that the lower level of revenues occurred despite the fact that the federal forecast of the economy's overall performance does not appear to have been all that bad. Mr. Benson forecast in his March budget that real growth would be in the neighbourhood of 3.0 per cent in 1970 with the rate of price inflation slightly less than the year before. In fact, real growth in 1970 turned out to be 3.3 per cent and the rate of price inflation was 4.1 per cent compared with 4.7 per cent in 1969. Despite this relatively correct overall forecast, personal income tax revenues increased by only \$612 million in 1970-71 compared with the original forecast of \$1,205 million, and, corporate income tax revenues declined by \$393 million compared with the forecasted decline of \$132 million. Partially offsetting this approximately \$850 million shortfall in income tax revenues was a \$530 million unforecast gain in other revenue categories.

<sup>20</sup>Hon. J. Edgar Benson, Budget Speech, (Ottawa: June 18, 1971).

<sup>21</sup>Hon. Edgar J. Benson, Budget Speech, (Ottawa: June 18, 1971).

<sup>22</sup>Hon. Edgar J. Benson, Statement to the House of Commons (Ottawa: Department of Finance, October 14, 1971).



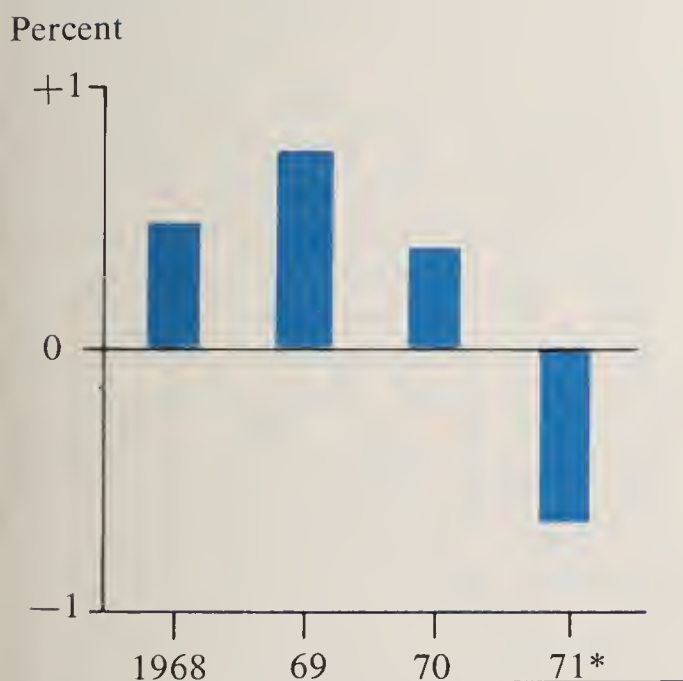
In conclusion, federal fiscal policy in 1971-72 has again shown the adaptability first demonstrated in 1970-71. However, despite the use of tax reductions this year (the actual cash benefit of which will in any case be delayed until late in the fiscal year) in addition to expenditure increases, the degree of flexibility in the 1971-72 fiscal program remains to be demonstrated.

#### Ontario Budgetary Developments in 1970 and 1971

##### Full-Employment Budget Estimates

The fiscal impact of the Ontario Government became firmly expansionary in 1971, reinforcing the more moderate expansionary thrust of 1970. Chart 6 shows that the full-employment budget surplus on a national accounts basis, measured as a percentage of GPP, declined in 1970 and 1971, after rising over the previous two years. The relative net fiscal impact shown in Chart 7, which is simply the year-to-year change in the full-employment surpluses shown in Chart 6, clearly demonstrates that the expansionary swing of 1970 and 1971 in relative terms is twice that of the contractionary impact of 1968 and 1969.

**Chart 6 – Government of Ontario  
Full-Employment Surplus, 1968-1971  
(As a percent of potential GPP)**

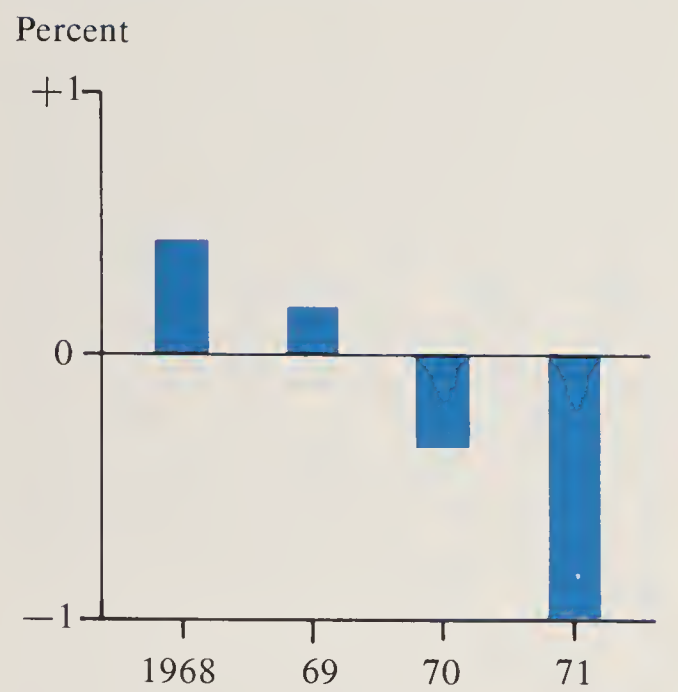


\*Estimated as at December 13, 1971.

Note: Full employment is defined for purposes of this analysis as the level of employment associated with 3.0 per cent unemployment. The budgeting concept employed is the national accounts budget and both revenues and expenditures are adjusted to their full-employment levels.

Source: Estimated by Department of Treasury and Economics.

**Chart 7 – Government of Ontario  
Net Fiscal Impact, 1968-1971  
Contractionary (+) or Expansionary (—)  
(As a percent of potential GPP)**



Note: The net fiscal impact measures the year-to-year change in the relative full-employment surplus shown in Chart 6.

Source: Estimated by Department of Treasury and Economics.

A comparison of the federal net fiscal impact relative to potential GNP for Canada and the provincial net fiscal impact relative to potential GPP for Ontario, reveals that the recent expansionary thrusts of the two levels of government in their respective economies have been of roughly the same relative order of magnitude. This point underscores once again the importance of provincial fiscal policy in the Ontario economy.

**Table II – Government of Ontario Financial Position, Fiscal 1970-71 and 1971-72  
(Millions of dollars)**

	1970-71		1971-72	
	Mar. 31/70 Forecast	Final	Apr. 26/71 Forecast	Dec. 13/71 Forecast
<b>Budgetary Transactions:</b>				
Net General Revenues	3,739	3,752	3,847	3,883
Net General Expenditures	3,728	3,846	4,262	4,436
Surplus (+) or Deficit (—)	11	—94	—415	—553
Net Non-budgetary Surplus (+) or Deficit (—)	63	152	71	194
Total Cash Surplus (+) or Requirements (—)	74	58	—344	—359

Source: Department of Treasury and Economics.

<sup>23</sup>As at December 13, 1971. See, Hon. W. Darcy McKeough, Introduction to Supplementary Estimates.

#### Budget Plans versus Realizations

Table 2 summarizes the changes in the financial position of the Ontario Government for fiscal 1970-71 and sets out the original and latest revised forecast for the current fiscal year.<sup>23</sup>

##### Original Ontario Fiscal Program for 1970-71

The Ontario fiscal plan for 1970, as presented in the March 31, 1970 budget,<sup>24</sup> was designed to provide a moderate expansionary stimulus to the economy. The inevitable slowdown in growth and employment under the weight of federal policies of restraint was recognized at that time, and the budget stated that any further restraint upon the economy would be excessive and contribute little to reducing the inflationary pressures. It was felt that such a fiscal program was appropriate in the face of an uncertain economic environment. The Ontario Government stated at that time that should the economic outlook deteriorate, policies would be quickly adjusted. This approach of creating a moderate stimulus stands in contrast to that outlined in the federal budget of March 1970, which, as noted previously, was aimed at strengthening the federal policy of restraint by introducing consumer credit controls and extending the deferral of capital cost allowances.

The moderate expansionary stimulus in the original Ontario budget plan was achieved by a combination of expenditure increases and tax cuts. The budgetary surplus was forecast at \$11 million, compared with a surplus of \$52 million in the previous year. The non-budgetary surplus was forecast at

<sup>24</sup>Hon. Charles MacNaughton, Ontario Budget 1970, (Toronto: Department of Treasury and Economics).



\$63 million, down sharply from \$283 million in 1969-70. The net flow of funds from budgetary and non-budgetary transactions combined was thus estimated at \$74 million, a decrease of \$261 million over the previous year.

The main items of the expenditure program included: supplementary tax relief for pensioners with limited incomes (\$10 million); increased financial aid to local governments to extend property tax relief (\$125 million); environmental control measures (\$12 million); establishment of a capital fund under Ontario Housing Corporation Limited (\$50 million), and expansion of insured health services (\$7 million).

Selective tax relief was provided in three areas: succession duties — principally increased exemptions for widows and widowers (at a cost of \$3 million); retail sales taxes — removal of the 5 per cent tax on a number of production tools in order to aid industry to reduce production costs (at a cost of over \$7 million), and accelerated capital cost write-off for water pollution control equipment (at a cost of about \$3 million).

#### Revised Ontario Fiscal Program for 1970-71

Table 2 shows that the original Ontario budget program for 1970-71 underwent substantial in-year change as did the March 1970 federal budget. The final figures for the year show that the surplus forecasted on budgetary account of \$11 million became a deficit of \$94 million, representing a swing of \$105 million. The forecast surplus on non-budgetary account of \$63 million increased by \$89 million to \$152 million. These budgetary and non-budgetary changes, being largely offsetting, thus had little impact on the total cash surplus — which at \$58 million remained close to the original forecast.

On the budgetary account both revenues and expenditures were higher than previously anticipated, but only expenditures increased significantly, rising by \$118 million over the original forecast of \$3,728 million. To a large extent the increases in expenditures were discretionary:

Expenditure increases included: property tax rebates for farmers and additional benefits in the form of property tax reduction grants for pensioners (\$25 million); extended medicare coverage (\$18 million); increased public housing subsidies (\$6 million); accelerated public works, increased vocational school construction and special winter employment programs (for a total of \$21 million); salary increases in the mental health program, and the introduction of a second language program (about \$12 million). In addition, general welfare expenditures increased automatically by about \$11 million due to higher levels of unemployment. Of the total increase in expenditures of \$118 million, approximately \$100 million resulted directly from changes to the original budget plan and thus was of a discretionary nature.

Non-budgetary account changes were also fairly large: receipts and credits were \$59 million above forecast and disbursements and charges \$30 million below forecast, for a net increase in the flow of funds originally anticipated of \$89 million. The increase in receipts was due to a more rapid rate of repayment of loans and advances and higher CPP receipts. The lower level of disbursements and charges reflected a slower than anticipated use of funds available for loans and advances.

These non-budgetary developments undoubtedly reduced the economic impact of the budget below that originally anticipated. Nevertheless, in view of the poor short-term flexibility of many arm's length expenditures, it is significant that *in-year* changes to the Ontario fiscal program were concentrated in the more flexible direct budgetary expenditures. In-year changes to the federal fiscal plan for 1970-71, by contrast, placed almost equal emphasis on increases in budgetary and non-budgetary expenditures. And, it was primarily due to the inflexibility of non-budgetary programs that the federal fiscal impact was very much lower than planned.

#### Original Ontario Fiscal Program for 1971-72

The Ontario fiscal plan for 1971-72, presented in the *Ontario Budget 1971*, on April 26, contained measures designed to continue and increase the expansionary thrust of provincial fiscal policy adopted during 1970. The policy design involved stimulating the economy primarily with substantial tax reductions while containing expenditure growth. It was felt that by these means private econo-

mic activity and investment could be increased and employment expanded without stimulating inflationary pressures. This policy contrasts sharply with that of the federal government which until June relied solely on expenditure increases to stimulate the economy and in fact included, in December, 1970, the decision to extend the personal and corporate income surtaxes.

In the original budget plan for 1971-72 the full-employment budgeting approach was applied, for the first time by any government in Canada, to the design of fiscal policy:

"Full-employment budgeting is particularly relevant to the current economic situation and the problem of fiscal policy co-ordination in the Canadian federal system. Budgetary deficits are commonly understood to be expansionary. However, the full-employment budget adds a new dimension to this conventional approach to fiscal policy formulation. It emphasizes the way in which revenues increase as economic activity revives and exert a "tax drag", thereby slowing down economic expansion, possibly before full employment has been achieved . . . Our plan for offsetting the slack in the economy and counteracting the federal government's tax drag in Ontario . . . First, in line with our objective of controlling the growth of the public sector, our expenditures have been held to a level of \$4.26 billion. This closely matches the level of expenditures which would be appropriate for us if the economy were operating at full employment. Second, we have cut taxes in a way which restores the growth potential of our economy. Thus, without any tax cuts our revenues at full employment could be expected to increase to some \$4.17 billion, with a resulting deficit of \$80 million. However, by cutting taxes, we will reduce the growth potential of revenues at full employment by about \$70 million to a total of \$4.1 billion, with a resulting deficit of \$150 million. Most importantly, however, the tax cuts in this budget are designed to offset part of the fiscal drag of federal revenue growth as the economy reacts to our planned budgetary deficit of \$415 million for 1971-72."<sup>26</sup>

While the overall level of expenditures was contained, the budget did include increases in spending in the following areas: a further increase in the level of financial support to

<sup>25</sup>Hon. W. Darcy McKeough, *Ontario Budget 1971*, p. 89.

<sup>26</sup>Hon. W. Darcy McKeough, *Ontario Budget 1971*, pp. 11 and 12.

<sup>27</sup>Hon. W. Darcy McKeough, *Ontario Budget 1971*, p. 24.

<sup>28</sup>These anticipations were subsequently borne out by the results of the Dominion Bureau of Statistics' survey of investment intentions for 1971 which called for a 2.9 per cent increase in capital expenditures on machinery and equipment in Ontario, compared with 13.2 per

cent the year before. *Dominion Bureau of Statistics and the Department of Industry, Trade and Commerce, Private and Public Investment in Canada, Outlook 1971*, (Ottawa: Information Canada, April, 1971).



local governments re property tax relief (\$78 million); an expansion of summer job opportunities for students (\$17 million); a doubling of the commitment for direct lending in housing; the allocation of funds to provide financial assistance to urban transit systems and to provide aid in environmental control.

Tax reductions, however, represented the prime method of directing the fiscal thrust. They were termed, "the key initiative in the budget to stimulate a revival of economic growth and job opportunities in Ontario."<sup>27</sup> The major tax incentive comprised a 5.0 per cent tax credit for investment in machinery and equipment. While this action meant an estimated revenue loss of \$125 million in fiscal 1971-72 and an equivalent amount in the following year, it was deemed essential to offset the slowdown anticipated in job-creating investments in new production facilities.<sup>28</sup> It should be noted that, for reasons stated in the budget, a reduction in the personal income tax was not considered to be a realistic alternative. Nevertheless, it is significant that a cut in the personal income tax was thought to be desirable at the time. In fact, a request was also made in the budget that the federal government reduce personal and corporate income taxes on a national basis through elimination of the "temporary" 3.0 per cent federal surtaxes. This step was eventually taken by the federal government in its June, 1971 budget.

### Revised Ontario Fiscal Program for 1971-72

On October 8, Prime Minister Davis announced further Ontario Government policy actions to reinforce the basic fiscal plan introduced in the April budget.<sup>29</sup> These actions, which comprised a two-part plan for economic stimulation, were deemed necessary in view of the lack of any improvement in the unemployment situation in Ontario and the uncertainties caused by the recent economic measures by the United States.

The two-part plan involves the balanced use of tax reductions and selective expenditure increases. These changes will result, as of December 13,<sup>30</sup> in an increase in the budgetary deficit of \$138 million to a record level of \$553 million. Expenditures and revenues are forecast at \$174 million and \$36 million respectively above the April estimates. The surplus on non-budgetary account is now forecast at \$194 million, compared with \$71 million in the original budget. Accordingly, total cash requirements to

finance net budgetary and non-budgetary transactions have increased to \$359 million, or \$15 million over the original budget figure of \$344 million.

The increase in budgetary expenditures of \$174 million is mainly discretionary as it includes substantial expenditures under a direct winter employment stimulation program and an acceleration of capital works projects started earlier in the year. In addition, it covers a variety of other discretionary measures detailed in the *Supplementary Estimates*. Only about \$12 million of the increase can be attributed directly to the automatic influence of the economy on the budget, due to the impact on welfare benefit payments of high levels of unemployment.

The increase in the forecast of budgetary revenues of \$36 million has occurred despite a reduction in personal income tax revenues amounting to \$28 million. An upward revision of \$75 million in the forecast of revenues from the corporate income tax is the major factor. This essentially reflects a change in anticipations with respect to the disposition of claims under the corporate investment tax credit scheme between 1971-72 and 1972-73.

In his statement of October 8, the Prime Minister of Ontario called for federal tax reductions to stimulate economic revival. He offered to join the federal government in implementing a cut in personal income taxation, recommending a complementary reduction of the provincial tax. With the federal announcement on October 14, the Ontario personal income tax was in turn reduced. This reduction will take effect in two distinct stages, involving a 3.6 per cent retroactive tax cut for the six-month period July 1, 1971 to December 31, 1971 at a revenue cost of \$22 million, and a 3.0 per cent tax cut for the twelve-month period January 1, 1971 to December 31, 1972, at a revenue cost of \$36 million.

In addition to the personal income tax cuts, the Ontario Government has proceeded with tax actions in three other areas. In September of this year reforms to the health insurance premium system were announced, involving principally abolition of premiums for persons aged 65 and over and for their eligible dependants effective January 1, 1972, and reduction in the total premium levels. This reform is expected to reduce total premium collections by \$127 million annually. The Ontario corporations tax is to be amended to ensure that federal employment support grants will not be taxable in Ontario.

Finally, major changes in succession duties designed to provide substantial relief to all categories of beneficiaries will go into effect on January 1, 1972.

The revision to the forecast of the non-budgetary surplus has followed the same upward pattern as last year, and for similar reasons. Receipts and credits are up \$36 million largely because of higher proceeds from CPP and other non-public debenture issues. Disbursements and charges are reduced by \$87 million mainly because of a slower than expected pick up of funds by various government corporations. On balance, these changes reduce the expansionary impact of the tax cuts and discretionary expenditure increases.

Nevertheless, in comparison with federal fiscal policy in 1971-72 three features of Ontario policy stand out:

- (i) it was based on an objective "full-employment budgeting" assessment of the impact of current policy;
- (ii) it included more emphasis on tax cuts rather than expenditure increases. In addition those increases in expenditures that occurred were mainly direct, rather than arm's length; and
- (iii) the major policy incentives — tax credits and cuts and winter employment expenditure programs — preceded similar federal action.

### III PROBLEMS OF DESIGNING AND IMPLEMENTING SHORT-TERM ECONOMIC STABILIZATION POLICY

The task of short-term economic stabilization is demonstrably very difficult. It is, however, even more complicated in a federal state such as Canada. The Ontario Government has expressed its view in this regard on many occasions,<sup>31</sup> and they will not be reiterated here. Nevertheless, in light of the obvious failure of federal policies to maintain high levels of employment, and in view of the absence of new federal initiatives with respect to federal-provincial fiscal policy co-ordination, it seems important to consider briefly those problems revealed in this paper. These are the problems of lags in the implementation of policy changes, the balance of policy-mix between expenditure changes and tax changes, and the problem of estimating the direction and degree of fiscal impact.

<sup>29</sup>Hon. William Davis, Ontario's Plan for Economic Stimulation, (*Queen's Park: October 8, 1971*).

<sup>30</sup>Hon. W. Darcy McKeough, Introduction to Supplementary Estimates.

<sup>31</sup>See for example: Hon. Charles MacNaughton, "The Public Sector and Economic Policy", Ontario Budget 1970; Hon. W. Darcy McKeough, "New Directions in Economic Policy Management in Canada", and

The Reconstruction of Economic and Fiscal Policy Co-ordination in Canada, a statement presented to the Meeting of First Ministers, Ottawa: November 15-16, 1971.



In section II of this paper, it has been argued that federal fiscal policy in the past two years has been far less effective than federal expectations have led us to believe. The basic problem was seen as one of *implementation*, in which the very long lags between decisions and actions were drastically underestimated. Of particular concern is the fact that despite the poor experience of the in-year changes to the expenditure programs in fiscal 1970-71, that route was again chosen to channel the major thrust of federal fiscal policy in 1971-72. Recognition of the importance of tax reductions came later, and only after widespread public prompting.

The Senate Finance Committee<sup>32</sup> has observed the following with respect to the problems of lags (not just those of implementation but of recognition, decision and impact also):

"Recent research indicates that these (time) lags are even longer and more variable than was previously thought. Canadian economic policy has not taken adequate account of lags nor are the existence and significance of lags sufficiently known to Parliament and the general public."<sup>33</sup>

The Ontario Government, in both its 1970 and 1971 budgets, has attempted to maximize the flexibility of its fiscal policy by containing expenditure growth while employing tax cuts as the major discretionary economic stimulus. In addition — and in contrast to federal policy — those in-year revisions to expenditures which have occurred have been mainly direct and not arm's length. Direct expenditures offer a greater degree of short-term flexibility. The Senate Finance Committee has supported greater emphasis on tax changes for short-term economic stabilization:

"The use of fiscal policy should lean more to adjustments in taxes than adjustments in government expenditures. Despite "tax shifting", (the treating of taxes as transferable costs) tax changes remain a highly effective means of stabilizing the economy."<sup>34</sup>

This paper has also emphasized the importance of the concept of full-employment budgeting to fiscal policy formulation. The Ontario Government employed this concept in its 1971 budget design. Once again the Senate Finance Committee has supported such a move:

"The Minister of Finance told us that he discerned some important practical difficulties in applying a high-employment-budgeting rule to the Canadian federal government and he questioned whether the concept would be particularly illuminating to the public or otherwise useful.

We took careful account of the Minister's views on this point. But we could not help observing also that the Ontario government, as well as the United States federal government, has seen virtue in the concept, and that both have found ways of adapting it to their needs. It seems to us that some reasonably flexible adaptation of the concept to the budgeting of the federal government in Canada would also be helpful.

We therefore recommend that the federal government adopt the concept of high-employment-budgeting, at least to the extent of always estimating, in budget presentations, what the budgetary position would be at high employment and of analyzing reasons for changes in the estimated figures since the previous presentation."<sup>35</sup>

The Economic Council of Canada<sup>36</sup> has also made use of the full-employment budget concept in analyzing the economic impact of the government sector in Canada to illustrate that fiscal policy of all levels of government has shifted towards less restraint over the past two years.

## CONCLUSION

The Canadian economy has been performing below potential for the past few years. In 1970, economic growth was particularly weak largely due to the lagged impact of federal policies of restraint adopted late in 1968 and applied throughout 1969 and into the first half of 1970. The original federal program for fiscal 1970-71 was designed to maintain this policy of restraint. Substantial in-year increases in planned expenditures, however, reversed the thrust of fiscal policy to one of expansion. Nevertheless, because of the existence of a long implementation lag, the actual fiscal impact of the revised 1970-71 program fell considerably short of federal expectations. Not only were total cash requirements for the year well below forecast but more than one half of the increase in cash requirements over the previous year was automatically absorbed by the weaker than expected performance of revenues.

Even so, the full-employment budget estimates show that — on a national accounts basis — the federal fiscal impact was expansionary in 1970, though nowhere nearly sufficient to completely reverse 1969's restrictive impact. In 1971-72, the planned federal expansionary swing is more pronounced partly because of a carry-over into the current fiscal year of unrealized 1970-71 spending intentions. Some carry-over of this year's program into next year appears inevitable, and it is thus unlikely that the full planned impact will materialize in 1971-72. However, the tax reductions in this year's program give it more flexibility than last year's, and there seems to be no reason to doubt that this combined expansionary fiscal impact of 1970-71 and 1971-72 is greater than the restrictive impact of 1969.

Ontario fiscal policy for 1970-71 was, in contrast to federal policy, designed from the outset to be expansionary, albeit moderately so. It showed the same adaptability as federal policy, undergoing substantial in-year changes intended to reinforce its expansionary thrust. In fact, in terms of the overall cash position, little change occurred during the year, because a larger than expected non-budgetary surplus offset the significant increase in the budgetary deficit. The full-employment budget estimates show, however, that the national accounts budget had an expansionary impact in 1970. Ontario fiscal policy was more flexible than federal policy because in-year changes in expenditures were concentrated in direct rather than arm's length categories.

The contrast in federal and Ontario budget plans which occurred in 1970-71 also appears in plans for the current fiscal year. The Ontario plan again moved more quickly than the federal program toward expansion with a combination of tax cuts and expenditure increases. The federal program expanded after Ontario's, and federal tax cuts came relatively late.

In the past two years, the fiscal impact of the Ontario government in the provincial economy has been almost as pronounced, in relative terms, as that of the federal government in the Canadian economy. Accordingly, the Ontario budget has become a key economic document insofar as the short-term economic stabilization of the Ontario economy is concerned. This recent evolution of an independent provincial fiscal policy in Ontario underscores the importance of fed-

<sup>32</sup>Hon. Douglas D. Everett and Hon. Hartland de M. Molson, Report of the Standing Senate Committee on National Finance on Growth, Employment and Price Stability, (Ottawa: Information Canada, 1971), page 40.

<sup>33</sup>Senate Finance Committee, Growth, Employment and Price Stability, page 21.

<sup>34</sup>Ibid. page 38.

<sup>35</sup>Ibid. page 38.

<sup>36</sup>Economic Council of Canada, Performance and Potential.



eral-provincial fiscal policy co-ordination.<sup>37</sup> Over the past two years the direction of thrust in federal and Ontario fiscal policies has, fortunately, been the same, although in terms of the timing of major initiatives Ontario has tended to move first. However, independent pursuit of contrary policies is a

possibility in the future given existing evidence of lack of co-ordination. This year, for example, in the absence of federal plans for dealing with winter employment problems, the Ontario government went ahead with its own program. Subsequently, the federal government instituted its program which

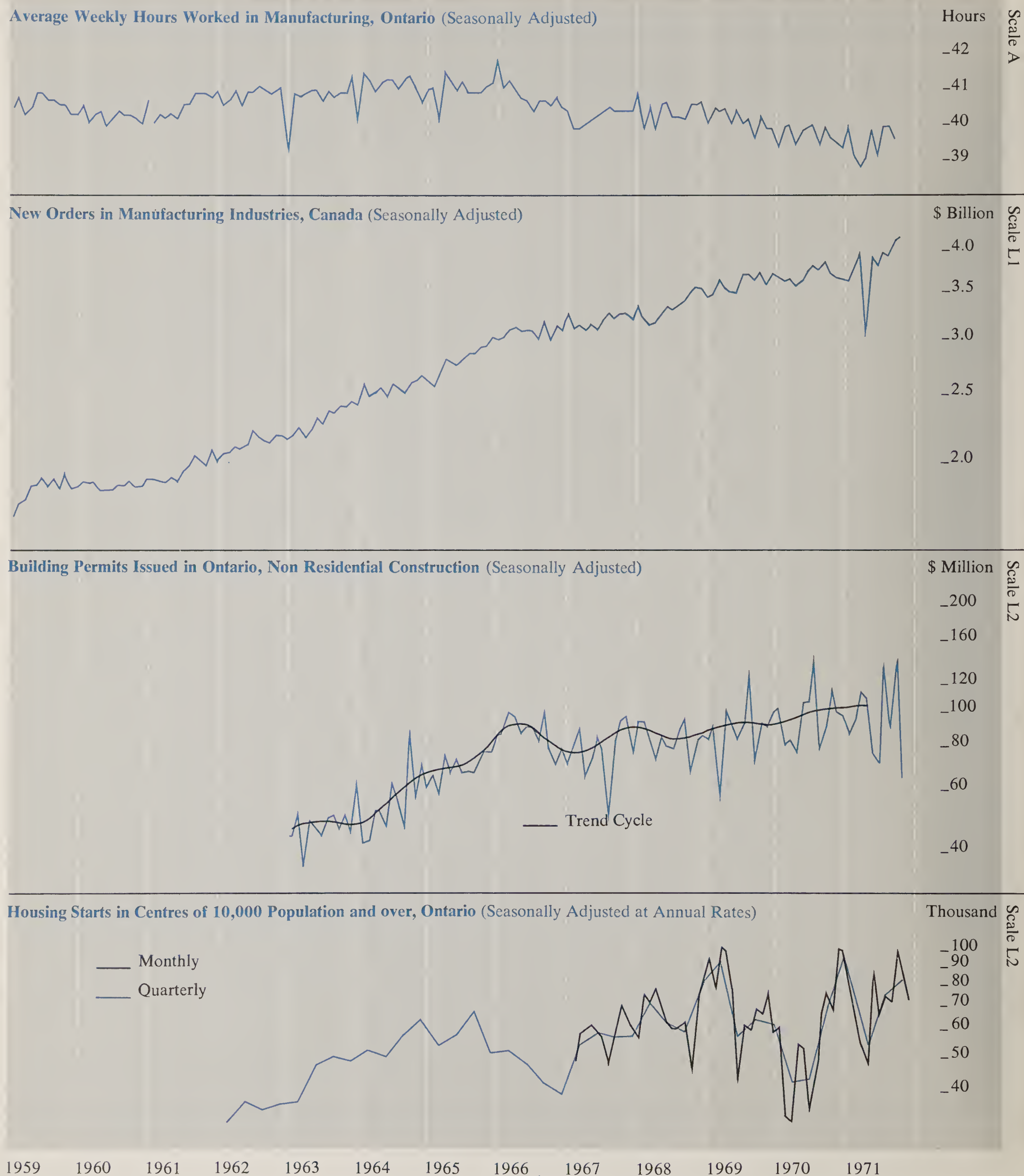
overlaps the Ontario program in certain areas. Such duplication limits the efficiency and flexibility of fiscal policy in Ontario. There is little doubt that the utilization of federal-provincial fiscal resources could be made more efficient through co-ordinated policies.

<sup>37</sup>In this regard it should be noted that the Ontario government has suggested the establishment of a Joint Economic Committee composed of federal and provincial Ministers of Finance

to annually review economic performance and set economic targets for the future. Agreement on this matter has been reached in principle. See Hon. William Davis, *An Economic Strategy*

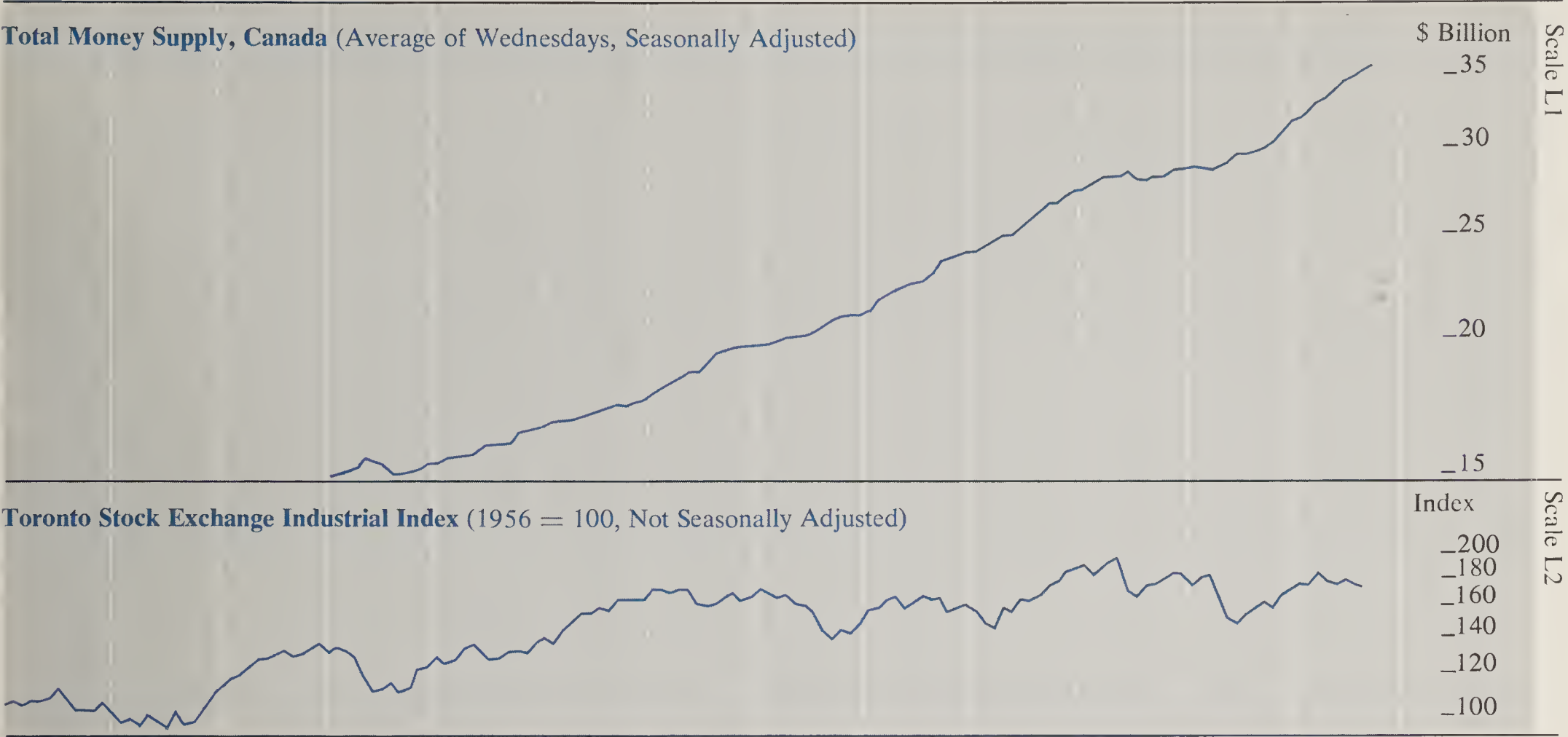
for Ontario, (Ottawa, October 14, 1971), and Hon. W. Darcy McKeough, *Introduction to Supplementary Estimates*.

## Leading Indicators

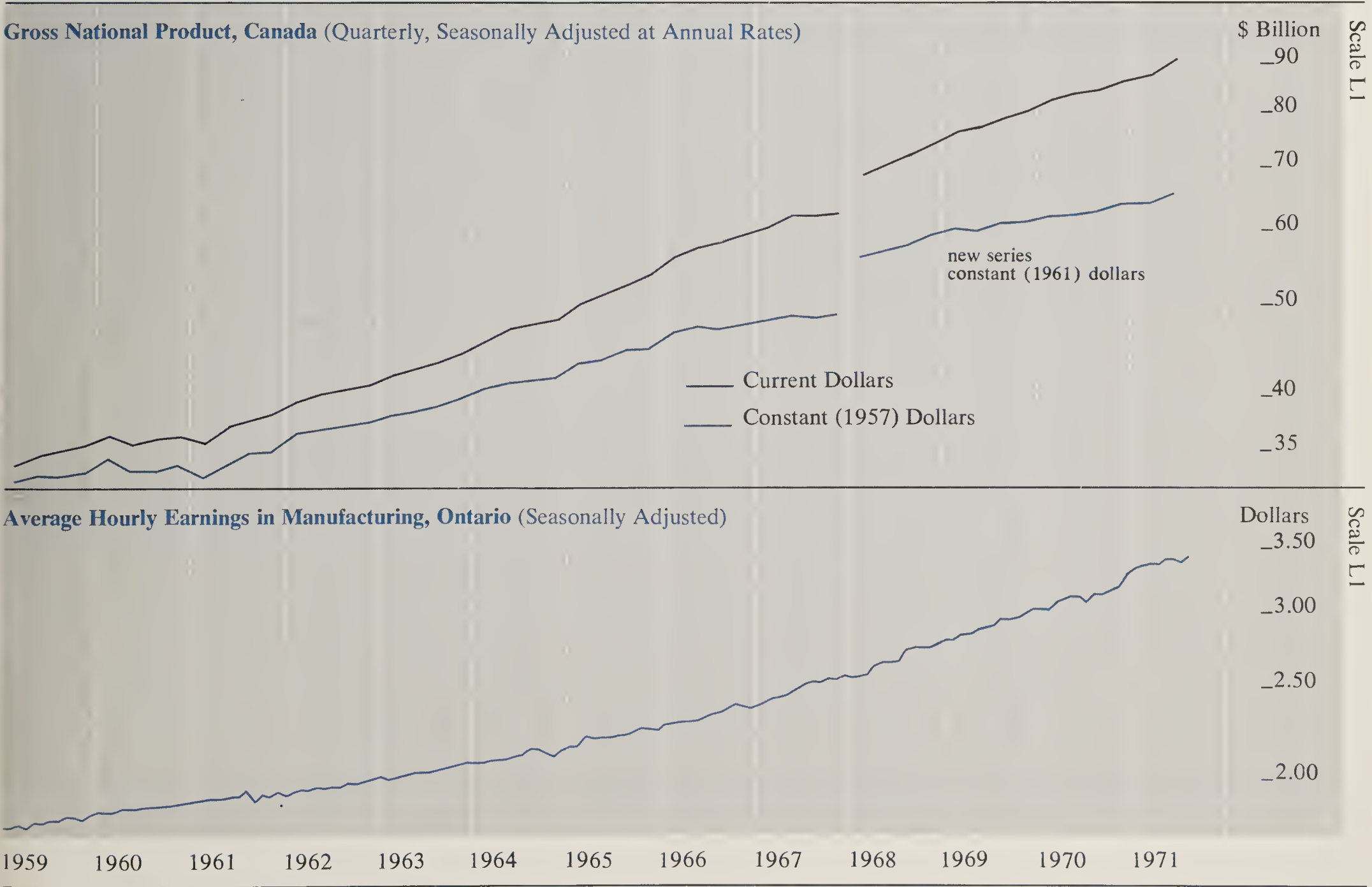




# Leading Indicators



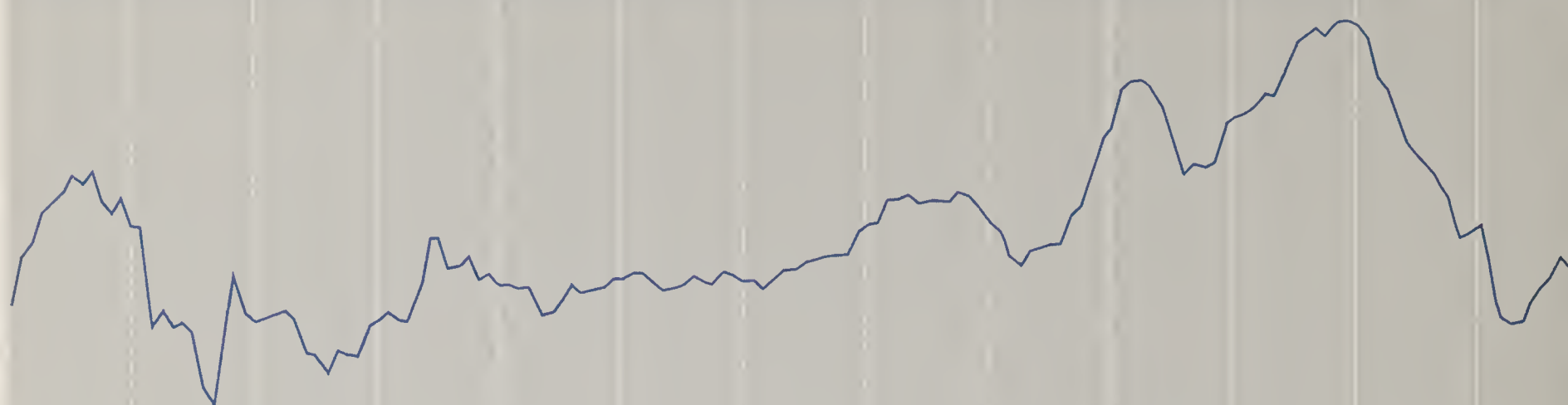
# Coincidental and Lagging Indicators



# Coincidental and Lagging Indicators

**Average Yield of 3-Month Treasury Bills, Canada** (Last Wednesday of the Month, Not Seasonally Adjusted)

Per Cent  
Scale A  
\_8.0  
\_7.0  
\_6.0  
\_5.0  
\_4.0  
\_3.0  
\_2.0



**Employment, Ontario** (Seasonally Adjusted)

Million  
Scale L1  
\_3.25  
\_3.00  
\_2.75  
\_2.50  
\_2.25



**Unemployment Rate, Ontario** (Per Cent of Labour Force, Inverted Scale, Seasonally Adjusted)

Per Cent  
Scale A  
\_2.0  
\_3.0  
\_4.0  
\_5.0  
\_6.0



**Index of Motor Vehicle Production, Canada** (1961 = 100, Seasonally Adjusted)

Index  
Scale L2  
\_400  
\_300  
\_200  
\_100  
\_70  
\_50



1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971

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Ontario economic review

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1971  
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Seasonally Adjusted

	1970					1971									
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	
Leading Indicators															
Average Weekly Hours Worked in Manufacturing	39.6	39.5	39.4	40.1	39.2	38.8	39.3	39.9	39.2	40.0	39.8	39.8	39.9		
New Orders in Manufacturing Industries <sup>c</sup>	3,754	3,697	3,689	3,686	3,885	4,034	3,097	3,975	3,961	4,130	3,994	4,267	4,335	4,264	
Building Permits Issued in Ontario, Non-Residential Construction	120.3	103.1	100.0	90.6	97.0	117.5	112.0	77.1	73.3	138.1	91.5	142.6	66.9		
Urban Housing Starts (Annual Rate)	69,200	106,000	103,800	82,300	60,600	55,600	48,400	88,000	67,900	75,000	73,000	99,400	82,900	73,600	
Money Supply <sup>c</sup>	30,194	30,624	31,197	31,696	32,135	32,511	33,144	33,495	34,292	34,896	35,016	35,393	35,949		
T.S.E. Industrial Index <sup>u</sup>	165.8	162.1	168.7	174.4	178.1	177.4	185.3	181.6	177.8	180.7	177.5	176.3	169.88	160.82	
Business Failures <sup>u</sup>	55	71	74	71	71	70	100	81	88	66	60	55	40	78	
Business Failures — Liabilities <sup>u</sup>	5.3	8.1	5.8	7.7	11.6	4.5	5.2	3.8	3.4	5.3	8.0	5.3	2.1	5.6	
Coincidental and Lagging Indicators															
Gross National Product <sup>c</sup> (Annual Rate)	84,988			86,376			88,372			91,392			93,676		
Average Hourly Earnings in Manufacturing															
3-Month Treasury Bill Rate <sup>c,u</sup>	5.39	5.01	4.40	4.44	4.68	4.06	3.16	3.00	3.03	3.37	3.68	3.79	4.06	3.98	
Cheques Cashed in Clearing Centres <sup>1</sup>	7,184	6,945	6,475	6,553	6,589	7,190	7,956	7,519	7,062	7,110	7,457	7,843	7,988		
Retail Trade	930	896	903	910	900	941	947	995	992	989	983	972	1,000	1,001	
Labour Force	3,145	3,166	3,167	3,151	3,215	3,223	3,197	3,207	3,232	3,231	3,230	3,232	3,288	3,306	
Employed	3,003	3,030	3,020	2,996	3,042	3,054	3,040	3,023	3,052	3,067	3,083	3,071	3,105	3,120	
Unemployed	158	147	156	162	173	169	157	184	180	164	147	161	183	186	
Unemployed as % of Labour Force	5.0	4.6	4.9	5.1	5.4	5.2	4.9	5.7	5.6	5.1	4.6	5.0	5.6	5.6	
Wages and Salaries	1,596	1,600	1,611	1,618	1,628	1,668	1,673	1,693	1,721	1,730					
Index of Industrial Employment	130.2	130.0	129.7	132.0	131.5	132.2	131.7	131.5	132.7	133.8	132.5	132.6	133.1		
Index of Industrial Production <sup>c</sup>															
Total Manufacturing <sup>c</sup>	169.1	168.6	171.5	170.5	171.7	172.9	172.5	171.2	174.7	175.7	176.3	179.1	179.7		
Non-Durables <sup>c</sup>	163.1	164.3	165.5	165.1	167.1	169.0	168.3	167.5	171.2	172.0	171.9	174.7	175.1		
Durables <sup>c</sup>	152.2	152.0	155.3	152.9	152.7	150.3	150.5	150.1	154.1	155.1	154.7	156.0	157.1		
Mining <sup>c</sup>	176.4	179.9	178.4	180.6	185.3	192.7	190.9	189.4	192.8	193.5	193.7	198.4	198.0		
Electric Power and Gas Utilities <sup>c</sup>	178.2	175.4	186.7	180.9	177.4	176.0	176.6	174.4	179.3	180.6	184.0	184.7	185.2		
Primary Energy Demand (Annual Rate)	208.4	195.0	194.8	201.0	203.2	201.9	202.2	198.5	197.4	198.6	202.1	207.8	210.0		
Exports (including re-exports) <sup>c</sup>	66.80	65.56	64.32	66.79	67.62	67.76	68.14	67.21	65.74	67.86	67.33	69.82	71.13	68.06	
Imports <sup>c</sup>	1,391.3	1,416.0	1,479.8	1,312.0	1,442.0	1,395.0	1,506.0	1,397.0	1,463.6	1,550.0	1,457.0	1,524.0	1,526.0	1,556.6	
	1,184.5	1,006.0	1,138.0	1,020.0	1,128.0	1,181.4	1,338.8	1,181.2	1,279.9	1,344.0	1,321.0	1,387.0	1,284.0	1,466.7	
Unclassified Indicators															
Foreign Exchange Reserves <sup>c,u</sup>	3,785	3,831	3,871	3,813	3,816	3,868	3,944	3,962	3,998	3,977	4,056	4,319	4,308		
Industrial Materials Price Index <sup>c,u</sup>	269.2	267.4	266.4	264.2	264.2	266.0	266.4	267.6	267.1	267.4	266.6	267.4	267.1	266.9	
Consumer Price Index <sup>c,u</sup>	130.2	130.3	130.3	129.8	130.3	130.9	131.3	132.2	132.7	133.0	134.1	135.0	134.7	134.9	
Toronto <sup>u</sup>	127.3	127.1	127.3	126.1	126.7	127.2	127.7	128.3	129.2	129.5	130.2	130.6	130.7	130.2	
Ottawa <sup>u</sup>	127.7	127.5	127.6	127.2	127.5	128.3	129.0	129.7	130.5	130.9	131.8	132.0	131.7	131.6	
Purchasing Power of 1961 Consumer Dollar <sup>c,u</sup>	—	—	—	—	0.77	0.76	0.76	0.76	0.75	0.75	0.75	0.74	0.74	0.74	

<sup>c</sup>Statistics for Canada.  
<sup>u</sup>Not seasonally adjusted.  
<sup>1</sup>Ontario less Toronto.

